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A REVISION OF THE AMERICAN PAPILIOS.

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AFTER the publication, in 1895, of the *Revision of the Papilios of the Eastern Hemisphere, exclusive of Africa*, we intended to continue the work by revising also the Papilios of the Aethiopian Region and of America. However, we soon found that the material at our disposal from these regions was not extensive enough, and therefore postponed the researches. We knew our task to be specially difficult with some groups of American Papilios, which are either so variable individually or present such slight external specific differences that, in the absence of breeding from the egg, a comparison of long series of specimens appeared to us necessary to render the conclusions reliable. Since 1895 the collection of Lepidoptera in the Tring Museum has been steadily increased, so that, after the issue of the *Revision of the Sphingidae* in April 1903, we considered the material large enough to base upon it a *Revision of the American Papilios*. We undertook the work the more readily, as we were assured of the kind assistance of several friends who were willing to place the material in their collections at our disposal for the purpose of this Revision. Many of the deficiencies in our collection have thus been made good, and the number of specimens compared has been rendered considerable in the case of most species. We take this opportunity of tendering our very best thanks to all who have so kindly assisted us.

The collection of the British Museum, containing the types of the numerous names given to Papilios by Doubleday, Gray, Hewitson, and others, and the collection of Mr. F. Ducane Godman, comprising not only a large Central American material, but also many South American forms which are rare in collections, have been of the greatest help to us. We have also examined the specimens in the large collections of Messrs. H. Grose-Smith, H. Druce, and H. J. Adams, as well as the Hopeian collection at Oxford, all of which contain material which it was very important for us to see. Of Continental collections we have visited those of Monsieur Paul Dognin, the Paris Museum, and Monsieur Charles Oberthür; and Dr. Rebel has been kind enough to send us some of the types of Kollar and Felder contained in the Hofmuseum at Vienna. The most valuable assistance has been rendered to us by Monsieur Charles Oberthür, whose magnificent collection comprises, in addition to the numerous specimens described by Boisduval, and others described by Lucas, a very large recent material, among which there are a number of forms which we have not seen in other collections, several being undescribed.

We have further been assisted in our task of clearing up the synonymy by photographs of some Godartian types preserved in the Royal Scottish Museum at Edinburgh, and of some Hopfferian specimens in the Berlin Museum, and we

are also indebted to Herr G. Weymer for a sketch of *P. orthosilaus*. We have not had an opportunity of visiting for the purpose of this Revision the fine collection of the late Dr. O. Staudinger. However, we do not think that we have made a mistake in regard to any of the forms of *Papilio* of which the name-type is contained therein, nearly all the forms described by Dr. Staudinger being now also in other collections.

The series of *Papilios* sent for inspection by Prof. Dr. Goeldi, the founder of the well-known Goeldi Museum at Pará, has been very serviceable. We were the more pleased to have these specimens for examination, as our own material from the Lower Amazons is very limited.

With the exception of the North American forms, the literature on the American *Papilios* is generally not very extensive. There are comparatively few local lists of South and Central American Lepidoptera, collectors of neotropical butterflies apparently not being given to publishing lists of captures, as is so frequently done with African Lepidoptera. We are not over-sorry that this is so; for we have found some of the lists more a source of trouble than a help, on account of the species being partly enumerated under obviously wrong names.* In the case of some difficult species, such as *P. protesilaus* and *P. iphidamas*, we have been obliged to discard a number of references, as we could not possibly ascertain which of the numerous allied forms is concealed under the name quoted in the list. Otherwise we have endeavoured to make the bibliography fairly complete. Most of the works referred to are in the Tring Museum, and those which are wanting have been consulted at the British Museum, very few books being quoted in this Revision which we have not seen ourselves. We hope, therefore, that we have not missed any observation of importance bearing on our subject, or names proposed for American *Papilios*.

However, although there is little written about the greater percentage of American Swallowtails, the literature presents nevertheless a great deal of nomenclatorial intricacy, which it was one of the objects of this Revision to unravel. Owing to a great looseness in the descriptions published by some of the old authors, and an equally great arbitrariness in the application of names, the nomenclatorial puzzles are numerous and partly difficult to solve. This laborious research in mere nomenclatorial matters might easily have been avoided for the greater part, if a little more preciseness had been exercised on the part of the authors of names. We can only regret the unnecessary burden unconsciously put on the revisers by former authors; but we express the hope that it will serve our contemporaries, as it has served us, as a warning not to be equally loose in matters nomenclatorial and vague in the introduction of new names. A name too many does not much matter, if one knows to what it is meant to apply; but a name which one does not know where to place correctly is a great nuisance.

It is now close on a century and a half since the publication of Linné's *Systema Naturae* (1758), the starting-point in nomenclature. The knowledge of American *Papilios* was extremely meagre at that time, only seven different species (*glaucus*, *philenor*, *thoas*, *aeneas*, *anchises*, and *protesilaus*) being distinguished by a

* An erroneous name for a species is distinguished by us in the synonymy from the preoccupied name by putting *err. det. (error determinationis)* after the author who misapplied the name. For instance, *Papilio asterioides* Staudinger (non Reakirt, 1863, *err. det.*) means that Staudinger called an insect *asterioides* Reakirt which was not Reakirt's insect; while *Papilio mentor* Boisduval (non Dalman, 1823) means that Boisduval gave, in 1836, to a new species the name *mentor* which had already been employed in 1823 for another insect.

name in that fundamental work, an eighth name (*antilocheus*) being proposed for an exaggerated and partly fictitious figure of the male of *P. glaucus*. Small as this number is, it presented a good deal of contentious matter for subsequent authors to write about. Linné laboured under the great disadvantage that, as a reformer of the methods in Natural History, he had to base his work not on actual specimens alone, but had also to include the recorded forms of animals which he did not know authentically.

Since the pre-Linnean descriptions and figures are for the greater part very poor productions, Linné was frequently misled to quote these figures and descriptions in a wrong place. Some of his erroneous quotations, however, are doubtless due to mere oversight or absentmindedness—as, for instance, the citation of *Edw. av.* 34* under *Papilio ajax* in 1758, under *P. protesilaus* in 1764, and again under *P. ajax* in 1767, Edwards's figure not agreeing in the least with the other quotation given in 1758 and 1767, or with Linné's own description. The citations under *P. protesilaus* comprise several *Nymphalidae* and *Papilionidae*, the references under *P. anchises* being also wild. Now, in dealing with such names, it is obvious that the description given by Linné must be the primary guide in the application of the name; at least, so it appears to us. The three Linnean names are good illustrations of the different results one arrives at. In the case of *P. anchises* the description and the reference to the Museum Ludovicæ Ulricæ (M. L. U.) leave no doubt that the insect figured by Clerck in 1764 is the true *P. anchises*, though post-Linnean authors have often erred in the application of the name. No such positive result can possibly be arrived at in the case of *P. protesilaus*. From the descriptions given by Linné in 1758, 1764, and 1767, we can only conclude that *P. protesilaus* was one of the numerous white neotropical species distantly related to *P. podalirius*. Among the figures referred to by Linné in 1758 there is only one which does not contradict Linné's description. This figure of Merian is unfortunately very incorrect. In 1764 Linné gave a better description, which, taken in conjunction with Clerck's figure referred to by Linné, applies best to that species to which we have restricted the name in this Revision. Since neither the figure nor the description is exact enough for absolutely certain identification, it is obvious that Linné's specimen, if he had one, may very well have belonged to one of the other white Papilios. However, it would only be possible to disprove the correctness of our application of the name *protesilaus*, if the authentic specimen from which the description was presumably taken were preserved, and in a sufficiently good state of preservation to exhibit those delicate differences by which the various species allied to *P. protesilaus* are distinguishable. Perhaps one might agree in this case with Mr. G. H. Verrall † that it is fortunate there is no such Linnean specimen, since it is really very indifferent which species bears the name *protesilaus*, as long as there is no possibility of our application of the name being justly reversed.‡ Nevertheless, this case renders

* *Edw. av.* p. 36. t. 226 is quoted by Linné in 1767 on p. 756 under his *Papilio Eques Heliconius thallo*, and again p. 807 under *Sphinx pectinicornis*.

† Presidential Address, in *Proc. Ent. Soc. Lond.* for 1900. p. 47.

‡ There are two specimens of this group of species in Linné's collection preserved at the Linnean Society in London. One specimen is similar to Clerck's figure, while the other is *P. telesilaus*. Unfortunately a former librarian, under whose care (!) the collection was, thought fit to supplement the collection by adding fresh specimens!! It is therefore hardly possible to say if these two Papilios, or one of them, were originally in the Linnean collection. The one which agrees fairly well with Clerck's figure has no abdomen.

it quite clear that, as the distinguishing characters of the various species in question have never been recognised, absolute certainty as to the application of the name *protesilaus* might only be arrived at by ourselves examining the original specimen on which the description was based, or the "name-type," as such a specimen may conveniently be called. In all instances where new distinguishing characters are discovered between forms which were formerly considered the same, it is nearly always indispensable for a conscientious reviser to examine the name-type of each form. As long as the baptizers of new forms are not omniscient, and hence are liable to publish descriptions and figures which future discoveries may render insufficient, a great deal of instability in nomenclature and of haggling about names, and therefore of waste of time, would be avoided, if every name introduced were made monotypical, and the name-specimen carefully preserved. Many systematists are fortunately in the habit of doing this, thus saving future classifiers much unnecessary labour. The habit of designating as type every specimen of the series the describer had originally before him is not to the point, since there is no guarantee that all these specimens are the same. The history of American *Papilio*s offers many examples of composite species, and not only among those described in the eighteenth century, as will be seen in the body of this Revision. If Linné had been quite precise in the application of his names, fixing each name to one particular specimen or a previously published figure or description, we should not now be in such a peculiar predicament with regard to his *Papilio ajax* as we are placed in. As said above, the description of this *P. ajax* and the two references given beneath it contradict one another, each applying, without the slightest doubt, to a different insect. The description fits the *Papilio* described later as *polyxenes* by Fabricius and as *asterius* by Cramer, and does not agree with the species which is generally known as *P. ajax*. If we had here to do with some little-known insects, we should hardly hesitate to apply the name *ajax* L. to the insect figured as such by Clerck—namely, *polyxenes* Fabr.

However, there is an enormous literature on both these insects, and the replacement of the names *polyxenes* or *asterius* by *ajax* would lead to endless confusion. The whole mischief is occasioned by Linné's reference under *P. ajax* to Edwards's figure. Now, this reference Linné himself removed to *P. protesilaus* in 1764. Under this same name *protesilaus* we find in 1758, 1764, and 1767 a reference to a figure in Catesby which represents the same insect as Edwards's. And in 1767 Linné described *Papilio xuthus* as being similar to *P. ajax*, which would have been quite ludicrous if Linné's *ajax* had been the insect now so called. There is a remote possibility that Linné described *ajax* from a small male of *P. glaucus*. For this reason we have thought it advisable to overcome the difficulty by rejecting the name *ajax* altogether on the ground of its being of doubtful application.

The name *ajax* does not appear in Linné's *Museum Ludovicæ Ulricæ*; this is unfortunate, since the descriptions given in that work are far superior to those of the *Systema Naturæ* of 1758 and 1767.

The most famous and, at that time, the most important post-Linnean works on Entomology were those of Linné's disciple Fabricius. The *Systema Entomologicæ* of 1775, the *Species Insectorum* of 1781, etc., were conceived on the same lines as Linné's *Systema Naturæ*. They gave a short, concise classification of all the insects known to the author either from specimens or previous publications. No

entomologist has ever exercised so much influence on the works of others, and for such a long time, as Fabricius. Nowadays the Fabrician works are rather a source of trouble. The descriptions are no better than in the *Systema Naturae*, and the frequent changing of names indulged in is most confusing. The nomenclatorial errors of Fabricius have, unfortunately, been perpetuated by subsequent authors, many of whom, as late as the middle of the last century, followed Fabricius blindly, giving his names preference to older ones, and accepting his identifications even if known to be erroneous.

The habit of supplanting the name of a species by a new one is bad only in so far as it swells the synonymy unnecessarily; but very pernicious it is to transfer arbitrarily a name from one species to another. This is occasionally done even nowadays, though not in so flagrant a way as by Fabricius. Some authors appear to be of the opinion expressed by Boisduval in 1836—that a name which has become a synonym on account of another name having priority, may be used again in the same genus for another species which has no name. Boisduval named a Brazilian species *P. mentor* according to this principle, though the name had already been employed for a closely allied species but become a synonym, stating: “Dalman a donné le nom de *mentor* à un autre *Papilio* qui est le suivant, et qu’Hübner avait fait connaître avant lui sous le nom de *lycophron*; nous avons eu pouvoir prendre sans inconvénient le nom de Dalman pour l’appliquer à celui-ci qui est nouveau.”* As this principle leads unavoidably to confusion, we are strenuously opposed to it. We go even further, and maintain that a name should not recur within the same genus even as a name for varieties.

A good many of the Fabrician descriptions were taken from specimens which he had seen in England during his several visits to this island, and from the unpublished drawings of Mr. Jones, of Chelsea. These drawings are now in the possession of Dr. Drewitt, a descendant of Jones. Dr. Drewitt has kindly allowed us to examine the drawings and to take photographs of some of the figures. The two volumes are in the best state of preservation, while Jones’s collection of insects had much suffered before it came into Dr. Drewitt’s hands. The execution of the drawings is admirable. There are ten names for American *Papilios* characterised by Fabricius from Jones’s drawings, respectively from specimens which had served as originals for these drawings (*pelaus*, *acamas*, *dardanus*, *tros*, *zacynthus*, *dimas*, *idacus*, *ilus*, *iphidamas*, and *homerus*). The specimens were in Drury’s collection, with the exception of *homerus*, which was contained in the collection of Latham. Since the Fabrician descriptions are mostly rather meagre, and as most of his types have disappeared, the preservation of Jones’s drawings is a very fortunate circumstance.

The butterflies described by Fabricius were revised in 1869 by Butler; but this revision was not so thorough as the subject required. With the help of Jones’s drawings we have been able to identify all the Fabrician *Papilios* about which there was some doubt.

In 1779 appeared the third volume of Goeze’s *Entomologische Beyträge*, which is a kind of catalogue enumerating all the Lepidoptera known at that time. A few critical remarks are offered by the author, often beside the mark; and some new names are introduced for some of Seba’s more or less bad figures, which might with advantage have been left unnamed.

The short descriptions of Linné and Fabricius being generally insufficient for

* *Spec. Gén. Lép.* i. p. 352 (1836).

precise identification, it was soon recognised that good illustrations were a necessity. The first iconographer producing figures which can be called good was Röscl. The productions of the earlier authors (Petiver, Moffat, Merian, etc.) as well as of some later ones, are much inferior to the plates in the *Insekten-Bebustigungen*. There are only a few figures of Exotic Insects in Röscl. The first iconography of great importance for the nomenclature of Lepidoptera, however, were the *Icones Insectorum* of Clerck (1764), the figures of which were for the greater part taken from specimens in the museum of the Queen Ludovica Ulrica, and hence may be considered typical.

Shortly after the appearance of the twelfth edition of the *Systema Naturae*, the last edited by Linné himself (1767), Drury published his *Illustrations of Natural History*, which is usually quoted for the sake of convenience under its subtitle as *Illustrations of Exotic Insects*. The three volumes contain only insects. The plates are nearly all very good for that time. In using the work one should bear in mind that in some cases the localities are erroneous, some North American insects being stated to have been received from Jamaica, and the reverse. However, in respect to localities the work was a great improvement on former authors.

If we find the localities given in the works of the earlier writers often deplorably vague and frequently erroneous, we must remember that the majority of the specimens were collected by people who did not take an actual interest in Natural History, but brought the specimens home as curiosities from foreign countries. Our forefathers in systematics had not the good opportunities we have nowadays of obtaining correctly localised material. They had to be content with what they got. The wrongly localised specimens misled them often to attribute a much wider distribution to many tropical species than they actually have, it being stated of many species that they occur in all tropical countries. The knowledge of the great importance of exact localisation has come very slowly; but we may now fairly say that every serious student of some branch of systematics is aware that specimens without exact locality are of little value to the scientist.

Being acquainted with many large collections of Lepidoptera, we note that the progress made during the last ten years in labelling insects is very marked. While the labels, if there were any, were formerly usually hand-written, bearing mostly only such general localities as Brazil, Venezuela, West Africa, etc., we find the labels of recent additions mostly printed, giving often, besides the exact locality, the date or season of capture, altitude, name of collector, and even some biological fact. No doubt we are on the right track, and there is hope that also the general collecting public, which depends to a large extent on dealers for additions to the collection, will soon follow, rejecting with disgust the specimens offered with such vague localisation as East Africa, Australia, or Amazons. On critically examining the geographical distribution of the American *Papilios*, we have come across many errors. Localities mentioned in the literature on these insects which are flagrantly wrong have been put by us between inverted commas (" ") in the bibliography quoted in this Revision, and have further been designated as *false* or *loci error*. In a few cases, however, where there is a possibility of the insect being found in the district, we have referred to the record from that locality as being doubtful or as requiring confirmation.

How erroneous localities get into collections and hence into literature is shown by the following instructive instance, where we can trace the error to its source. Strecker figured erroneously as *Papilio asterioides* Reak. a specimen of *Papilio*

polyxenes americus Koll., giving Costa Rica as locality. An itinerant German dealer, Heyne, sold as *P. asterioides* specimens he had received from Messrs. Standinger and Bang-Haas without locality labels. Heyne, following a custom of collectors and dealers, ticketed his specimens Costa Rica, the locality whence *asterioides* had been recorded by Strecker (such specimens with a label in Heyne's handwriting are in the Tring Museum). Eimer described and figured as *P. asterioides* similar specimens, giving as locality Mexico, these specimens having been received either from Heyne or direct from Standinger and Bang-Haas. Now, all these individuals are neither the *asterioides* of Reakirt nor of Strecker, but are unmistakably Cuban specimens of *P. polyxenes*. The locality Costa Rica and Mexico for them is "manufactured." We add that the error was not made by Messrs. Standinger and Bang-Haas; however, that firm is much to blame in selling their specimens without locality labels on the pins.

Fabrication of localities is even nowadays going on. We mention the following instance as a warning to other lepidopterists. Two specimens of what was said to be *Papilio oregonia* were offered to us by an American dealer, who had received them from a correspondent who apparently loves the dollar more than his honour. On receipt of the specimens we found them to be Old World *P. machaon*, one being a Sikkim individual, the other a British specimen! The specimens are labelled "Plumas Co., California, May '03." We are keeping them as a memento, an additional label giving the necessary explanation.

With the publication of Cramer's *Papillons Exotiques* the number of known forms of exotic Lepidoptera increased enormously.* Though the descriptions are useless and the figures not always good, very few of the numerous new *Papilios* are not sufficiently well represented for identification. Only one of Cramer's American *Papilios* has remained doubtful to us. This is *P. euristeus*, the figure of which does not agree with any specimen which we have seen. The figure is coarse, and may be erroneous, but it is also possible that the insect has not been rediscovered. Some of Cramer's American *Papilios* are very rare in collections, his specimens being mostly from Surinam, whence no extensive collections of butterflies have been sent in recent years. Collecting in the French and Dutch Guianas is difficult, we hear, owing to the extensive forests without roads and the impenetrable swamps, the only means of exploring the interior being by means of canoes. Moreover, the butterflies, some species excepted, do not appear in such great numbers of individuals as elsewhere, having to be searched for.

Jablonsky's *Natursystem aller Insekten*, continued by Herbst, introduces in the volumes devoted to Lepidoptera some original matter and many copies from Cramer, and contains also several artefacts. The figure which Esper named later *P. peleides*, and usually considered fictitious, may have been taken from an actual specimen; but nothing of the kind exists now in collections.

Far more critical than any of his predecessors and contemporaries was Esper, in whose work *Die Ausländischen Schmetterlinge* (1784—1801) all the species of *Papilio* which he considered distinct are depicted. The dates of issue of the work are given by Anrivillius in 1882.† The lengthy text accompanying the plates is difficult to understand for a non-German, being full of provincialisms and now antiquated words, the meaning of which the foreigner does not find

* The copy in the Tring Museum contains the original covers bearing the years of issue. We obtained this valuable copy from the library of the late J. H. Leech.

† *Revensio Critica*, in *K. Sv. Vet. Ak. Handl.* xix. 5. p. 182 (1882).

in ordinary dictionaries. There are many remarks which have quite a modern flavour.

The name *aeneides* on Esper's Plate 15 raises a point in nomenclature which we think it is necessary to discuss here, since our decision with regard to this name is opposed to that arrived at by most other authors. Esper described under the name of *P. aeneas* Linné two males of two different species, believing these males to be ♂ and ♀ of *aeneas*. These two specimens are figured on Plate 15. Though the figures are referred to as *aeneas* everywhere in the text, they stand as *aenides* on the plate, a name which is nowhere mentioned in the text. The name is doubtless due to a mistake on the part of the engraver, Bock. However that may be, is the name *aeneides* to be employed for the one of the two species called *aeneas* in the text which had no name at that time? The facts put in a formula are these :

$$P. aeneas \text{ Esper } \delta \text{ } \eta \text{ text} = P. aeneides \text{ in tab.} = \begin{cases} P. \text{ species indeterminate } \delta. \\ P. aeneas \text{ Linné } \delta. \end{cases}$$

In our opinion a new name proposed for a composite species sinks as a synonym if a component part of this composite species had already a valid name. In this instance, be the name *aeneides* a mere lapsus of the engraver of the plate, or a name intentionally given by Esper himself, there was no justification whatever for a new name, since the supposed female of what Esper considered to be a species had the valid name *aeneas*. Similarly Swainson renamed Linné's *Papilio protesilaus*, calling it *Protesilaus leilus*. The description and figure given by Swainson are, however, those of the Brazilian insect, not the Surinam form of Linné's species. Therefore what Swainson considered to be one species *leilus* consists of two forms, of which one had already the valid name *protesilaus*, *leilus* sinking consequently as a synonym of the latter. In general terms, if an author wishes to deal with A and B (individuals, varieties, species, genera, families) under one name, a new name is valid only if neither A nor B has already a valid name.*

Two of Esper's *Papilios* have been said to be antedated by names given in Martyn, *Psyche*. We agree now with Mr. Sherborn † that *Psyche* should be treated as non-published. There is one copy and portions of two others in the Tring Museum, some plates being numbered and others not. The plates have the appearance of being nothing but printer's proofs. However that may be, in the case of the two American *Papilios* (*aristodemus* and *hectorides*) Martyn has no priority over Esper, the latter having published a description and figure three years previous to Martyn in the *Magazin der Neuesten Ausländischen Insecten* (1794), a rare work which has been overlooked by recent authors. Esper himself quotes the *Magazin*, and it has also been mentioned by Donovan in *Naturalist's Repository*, Ent. ii., text for plate 177 (1827). It has not been consulted by Sherborn.

In 1797 there appeared what is perhaps the best lepidopterological work of the eighteenth century. *The Natural History of the Rarer Lepidopterous Insects of Georgia*, by Abbot & Smith, deviates entirely from the other iconographies above referred to in illustrating the life history of the insects observed. Apart from the pictures in Merian's *Insecta Surinamensia*, often fanciful and grossly incorrect, and Seba's worthless drawings of caterpillars and pupae in the *Thesaurus*, Stoll's Supplement to Cramer, *Papillons Exotiques*, was practically the only work

* See also *Nor. Zool.* ix. *Suppl.* p. xxiv. (1903).

† *Index Animalium* (1902).

containing illustrations of the early stages of exotic Lepidoptera. The *Natural History of Georgia* meant an enormous advance in this direction.

The series of lepidopterological works of the nineteenth century, as far as they concern us here, opened with Hübner's *Sammlung Exotischer Schmettlinge*, appearing from 1806 onwards. As a collection of fine illustrations the *Sammlung* was a great success, while as a scientific work it was an entire failure. With the exception of the separate volume, entitled *Zuträge*, there is hardly any text accompanying the plates. Sherborn* says that he does not recognise as valid the names appearing on plates without text. We wonder if he will be bold enough to reject the majority of the new names of the *Sammlung*. The plates not being numbered, and no date of publication † being given, the work is a great trouble in compiling the bibliography of the insects figured. As every little contribution towards fixing the years of publication of the plates is of some value, we draw attention to the fact that Hübner figures on Plates 114 and 115 of the second volume the identical insects which Godart described in 1819 as ♀ and doubtful ♂ of his *Papilio protodamas*, which name Hübner employed for the male. This can hardly be a coincidence. Hübner doubtless knew of Godart's publication when he engraved the two plates—*i.e.* the plates appeared after 1819.

Hübner's *Verzeichniss bekannter Schmettlinge* was published from 1816 to 1827 or 1828, the Papilios appearing about 1818. A few new names are proposed for American Papilios in this much-abused work, which represents the first attempt at classification of all the known Lepidoptera.

If Hübner erred much on the side of descriptions, Godart's treatment of the Butterflies in the *Encyclopédie Méthodique* ix. (1819) suffered from the entire lack of figures. The work is purely descriptive, but the descriptions are admirable for that time. It is a most careful piece of work. There are naturally a number of mistakes, especially in the mating of the sexes of dimorphic species, which is excusable, since hardly any reliable observations on di- or polymorphism among exotic Lepidoptera were known. Godart's species were mostly described from specimens contained in the Paris Museum. Very few authentic specimens are preserved; the majority appear to have become destroyed already during the first half of the last century. A few of the specimens are in the Royal Scottish Museum (*P. serville*, *triopas*, *imerius*). While previous authors, with some exceptions, employed generally the Linnean formula of nomenclature for Butterflies, interposing between the generic title *Papilio* and the specific name either the sectional name *Eques* or the subsectional name *Trojanus* (or *Troes*), respectively *Achivus*, or both these names (*Eques Trojanus* and *Eques Achivus*), Godart adhered to a pure binominal system of nomenclature. In the Supplement to his work, issued in 1824, several Papilios appear with modern personal names standing in the nominative form: *Papilio serville*, *P. devilliers*, etc. This kind of name for species had become the fashion in France. We do not consider it advisable to alter such names into *servillei*, *devilliersi*, etc., as has been done by most subsequent authors, *servillei* being no more Latin than is *serville*.

The custom of naming species after persons, which is nowadays almost a mania, hails from Linné himself, who named insects *Schüfferi*, *Bergmanniana*, *Listerella*, etc.

* *Index Animalium* p. vii (1902).

† The new edition of the *Sammlung* which is now being issued by P. Wytsman is accompanied by a text written by W. F. Kirby. Here, again, no date of publication of this text is given !!

Many of the entomological works of Godart's period have a French nomenclature, which cannot be considered valid. Rogers's names for Papilios published in 1826 cannot stand, the names given being *Papillon bias*, *Papillon pirithous*, etc.

A few of the specimens described by Godart were subsequently figured by Lucas in his *Lépidoptères Exotiques* (1835), which appeared shortly before Boisduval's *Species Général des Lépidoptères* i. (1836). This *Species Général* is a fundamental work for the study of Papilios. Many errors are cleared up, and also new ones are made. The original specimens from which the new species were described are nearly all in the collection of Monsieur Charles Oberthür. A few appear to have been replaced by Boisduval by specimens which do not agree with the descriptions. Such a result of the habit of removing from the collection the original specimens in favour of better-preserved individuals is very instructive, confirming our contention (see p. 414) that the type-specimen of a new name should be marked as such, and be carefully preserved. Barring accidents, the revision of the nomenclature of a family is made comparatively easy by that means, and, what is more important, the results are more reliable, and hence the nomenclature rendered more stable than if a reviser has only the descriptions and figures to go by. The nomenclatorial type, or "name-type" for short, is of no other importance. That should be clearly understood. Nomenclature is an extraneous matter. It is not the natural history, but only a convenient method of recording some of the results of descriptive science. The natural history types of one and the same species or form are manifold. One may call an individual a type, if it represents the average. Since the same individual is not the average in all characters, a species or form has many average-types, one individual being a morphological type in one detail of structure or pattern, other individuals in other details. There are, further, two kinds of phylogenetic types. Specimens which are the most generalised in a certain character may be called ancestral types in respect to this character, others being ancestral types in other organs. Some individuals are more advanced in certain characters than other specimens, and therefore represent a more advanced type, other individuals being more advanced in other details. Since the variation of the various organs is to a large extent independent—*i.e.* since retrogressive or progressive development does not take place in the same degree in the various organs—an individual may be an average type in one organ, an advanced or an ancestral type in another, and not typical in a third organ. To these morpho- and phylotypes may be added bionomical types, habits being also variable within a species; and so on. It is obvious that all these types have nothing to do with the name-type.

Besides Drury's *Illustrations of Exotic Insects* (1770-82) very little of importance on American Papilios was published in England during the eighteenth century and the first four decades of the nineteenth. The *Zoological Illustrations* by Swainson and Donovan's *Naturalist's Repository** were the only works which contain more than an occasional reference to exotic Papilios. This became entirely altered in the forties. With Doubleday's *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum* (1845) commenced a series of catalogues which, though in the first instance meant to be a list of the contents of the British Museum collection, became synonymic catalogues of all the species and varieties described. Doubleday's *List of 1845-48* was followed by his *Genera of Diurnal Lepidoptera* (1846-52), by Gray's *Catalogue*

* Each plate of the *Repository* bears the date of publication.

of *Lepidopterous Insects* (1852), and Gray's *List of Lepidopterous Insects* (1856), both works of Gray dealing only with the *Papilionidae*.

The *Catalogue* of Gray is for our subject the most important of these publications, since it contains descriptions and figures of numerous new "species." The work is faulty in many respects. The figures are in some instances misleading on account of errors in coloration, the sexes are often wrongly mated, and the localities are not always reliable.

In these English catalogues we find for the first time *nomina nuda* of American Papilios, names without any attempt at description, the author of such names considering it apparently sufficient publicity if the name was in a museum behind the specimen. This bad example has fortunately not been followed in the case of American Papilios by later authors, excepting certain Continental dealer-authors, who did it for the sake of earning an additional shilling, the purchasers of specimens paying more for a supply of named specimens than for unnamed ones. Such an abuse of nomenclature cannot be too strongly condemned.

During the fifth and sixth decades quite a number of new American Papilios were described by Kollar, Lucas, Ménétriés and others. Among the Lepidoptera recorded from Cuba by Lucas, in *Sagra, Historia Fisica* vii. (1857), there are several that do not occur on the island. The species published by Lucas in the *Révue de Zoologie* for 1852 were mostly based on specimens lent to him by Boisduval, and are now contained in the Oberthür collection.

Kollar's species were collected by Prince Sulkowsky. In dealing with the list of captures published in 1850 one must bear in mind that Sulkowsky travelled up the Magdalena River, and crossing the Cordillera of Bogota went down the Rio Meta and Orinoco. The localities of the specimens have not in every case been carefully kept, some specimens said to be found near Angostura (Ciudad Bolivar, on the Orinoco) being doubtless of Colombian origin.

So far very little was known of the habits of the butterflies of tropical America. The study of exotic insects was almost purely museological. The more valuable were the essays on the Amazonian fauna published by Wallace and Bates. The essay on the Papilios of the Amazons by Bates (in *Trans. Ent. Soc. Lond.* 1861) is a classical work. It is full of notes on habits, distributions, and on geographical and individual variation which were quite new at that time. Nothing equalling this essay has since appeared on tropical American butterflies. However, in his references to non-Amazonian forms Bates was very often at fault, nor have all his conclusions as to variability and distribution in the Amazon valley been borne out by recent explorations and researches. It is a great pity that the material collected by Bates has been scattered over many collections. Variation cannot be studied without comparison of long series of specimens. The problems of the distribution of the various geographical varieties in the Amazonian fauna touched upon by Bates will remain open till adequate material (properly labelled) is available. Everybody has Amazonian Papilios, but nobody has long series from a sufficiently large number of localities. The large collections made by Dr. Hahnel—the best collector of butterflies who ever visited South America—are also scattered.

Shortly after Bates's essay there appeared a work of quite a different character, but of no less importance. The *Species Lepidopterorum huiusque descriptae vel iconibus expressae*, by C. & R. Felder, contains, like Gray's *Catalogue* and *List*, only PAPILIONIDAE. It is the first classification and revision of the entire family which might be called thorough. The species are mostly grouped correctly, with

the exception of some mimetic forms, which are classified with their models. In characterising the groups of species the Felders laid great stress upon small differences of venuration, in which they were wrong. The series of specimens compared by the authors was generally small, and therefore many small differences appeared to them to be constant, while they are in fact individually variable. The same applies to differences in size, wing-shape, and pattern, which served the Felders as specific distinctions. The numerous "species" of *Papilio* described by them in the essay mentioned, in the *Reise der Fregatte Novara*, and elsewhere, are mostly varietal forms, often mere individuals deviating in some character from the average. In many cases the authors were well aware that the new "species" of *Papilio* was a geographical form; in fact, they make sometimes a statement to that effect. However, they treated nomenclatorially all such forms as species. This curious phenomenon is by no means uncommon among systematists of our day. To consider all geographical representative forms as distinct species, and treat them as such nomenclatorially, is quite consistent. To regard all individual, seasonal and geographical varieties of a species as not necessary to be distinguished by special names and hence deal with all of them under the one specific name, is again methodical. But to call a form a local race, naming it *Papilio pandion*, and to employ the same formula *Papilio anchisiades* for the species, is certainly ill-considered. The formula expressing a conception should show which special conception is meant, whether a family, a subfamily, a genus, a species, a geographical form or another kind of variety. It will doubtless take a long time before all systematists have learned to employ a nomenclature which is consistent with their own ideas. The more is it necessary to bring the matter again and again before their mind.

The Felderian types are mostly in the Tring Museum, some being in the Hofmuseum at Vienna.

In the second half of the last century the number of works and treatises dealing with American Lepidoptera increased very rapidly. In North America especially entomologists became very active in the sixties, and have ever remained so, being now in some branches well in advance of European systematists. We mention here only those authors whose work is of special importance for our Revision.

The species of *Papilio* described by Hopffer in 1866 have partly been overlooked subsequently. We hope that we shall be found to have identified them correctly. Kirby's *Catalogue of Diurnal Lepidoptera* (1871; Supplement, 1877) is too well known to require more than passing mention. The nomenclature of varieties needs purifying. The formula "*Papilio eurimedes* Cram. var. a. *P. agathocles* Koll." for a variety is very cumbersome. The work has been most useful to us, in spite of the errors in synonymy, which are hardly avoidable in a compilation of this kind. A second edition of the catalogue is a great desideratum.

The Lepidoptera of the Argentine Republic are dealt with by Burmeister in his *Description Physique de la République Argentine*, vol. v. (1878) and *Atlas* (1879). The figures of the early stages, though some are not correctly identified, are very useful.

Another faunistic work of the same time is Gundlach's *Contribucion á la Entomologia Cubana* (1881). It is a descriptive catalogue in which former work on Cuban Lepidoptera by Poey, Lucas, Herrich-Schäffer and others is revised, notes on the life-history of many species being added. Since Gundlach had resided so

long on Cuba, nobody was better fitted to write on the subject. One of the prettiest American Papilios bears his name (*P. gundlachianus*). Unfortunately we are bound to employ for it the older name *columbus*, given to it previously by Gundlach *in litt.* and published by Herrich-Schäffer. The insect was renamed *gundlachianus* by Felder, because the name *columbus* had already been employed for another species in the genus *Papilio*. Our reasons for retaining nevertheless the name *columbus* for the Cuban species are of a general nature.

We distinguish between the name of a form (species or variety) and the nomenclatorial formula in which this name appears. *Papilio marcellus* f. *telamonides* is the formula for the summer variety of the North American species *Papilio marcellus*, the name of this variety being *telamonides*. Some authors consider it permissible, or even advisable, to replace the name by a new one, if the supposed variety turns out to be a distinct species. Among prominent Lepidopterists this view was held by Nicéville. If the principle were correct, one ought consequently to replace a name by another also in the case of supposed species being proved to be varieties, or a supposed geographical form to be seasonal, etc. We regard this opinion as utterly opposed to stability in nomenclature. The first name given to a form, if not *preoccupied*, is the name of this form, whatever position the name takes in the nomenclatorial formula according to the individual opinion of an author. Now, systematists differ as to when a name is preoccupied. Leaving aside the view that a name is preoccupied by another which has the same root or the same meaning (*fluciatilis*, *fluciorum*; *alboniger*, *leucomelas*), there are two opposite opinions with regard to this question. Most systematists adhere to the rule that a name is preoccupied if at the time of its publication there was already a name identical in spelling in the genus where the new form was placed by the author. This rule would be excellent, and we should adhere to it, if there were not serious drawbacks. Opinion as to the extent of each genus is not at all unanimous, and never will be. According to one author a certain genus contains many species; according to another writer only one or a few belong to it. Hence it is often impossible to decide, if at the time of publication of a new form the name was or was not contained in the respective genus as conceived by the author of the new form. For instance, if somebody published to-day a new Swallow-tail, calling it *Papilio ulysses*, who will decide if this name is preoccupied, since some authors restrict the generic title to *machaon* and allies, others to *priamus* and allies, others again to some Nymphalids, while the majority of Lepidopterists comprise in *Papilio* many hundreds of differently organised *Papilionidae*? To follow the above rule consistently is the more difficult in the case of Lepidoptera, as the genera were formerly so very extensive that the species belonging at one time to a single genus are now often distributed over several families. There is, moreover, the great difficulty in Lepidoptera that one would have to decide whether *Papilio Eques Trojanus dardanus* Fabr. (1793) is preoccupied by *Papilio Eques Achivus dardanus* Brown (1775) or by *Papilio Danaus Festivus dardanus* Cram. (1775); and whether *Papilio Eques Achivus orestes* Fabr. (1793) is superseded by *Papilio (orestes)* Meerb. (1775). The above rule further compels us to ask, if *Papilio harmodius* Doubl. (1845) which is a swallow-tail, is preoccupied by *Papilio Nymphalis Festivus harmodius* Cram. (1779), which is a moth, or the name of the swallow-tail *Papilio hesperus* Westw. (1843) by *Papilio Festivus hesperus* Fabr. (1793), which is a Nymphalid?

Now, there is no difficulty about these questions, and there can be no difference of opinion, if one accepts our principle of dealing with such names. We consider

a name preoccupied only if there is an identical older name in the genus to which the species or variety *now* belongs, it being quite irrelevant whether the name was or was not preoccupied in the genus where the author originally placed the form. *Papilio brutus* Fabr. (1793), which is a swallow-tail, does not sink as a synonym on account of *Papilio brutus* Cram. (1775), which is a Nymphalid. As in the case of the Revision of the Papilios of the Eastern Hemisphere (1895), we revert also in the present Revision to the first name of each form, though this name may recur in this so-called genus *Papilio*. In our proposed generic revision of the *Papilionidae* the forms which appear homonymous in the present work will come under different generic titles. The number of such names is very small, and it is certainly advisable to bring already here the names of the forms in accord with the names they will bear in the generic revision of the family.

The list of Papilios in his collection published by Charles Oberthür in 1880 contains many useful hints, besides a number of fine figures, and descriptions of new forms. The collection was very small at that time as compared with what it contains now.

Aurivillius, in 1882, gave a revision of the Lepidoptera described by Linné in *Museum Ludovicae Ulricaë* (1764). Though there are some points which the author could not satisfactorily decide for want of adequate material, the essay is an example of very painstaking work, nothing being taken for granted and every question carefully investigated. It is a *Revisio Critica* in the true sense.

The only popular work on exotic Butterflies which it is necessary to mention here is Standinger's *Exotische Tagfalter*. The book, which was destined for the great mass of "collectors" of butterflies, was not meant to be a critical entomological work. But, in spite of numerous errors in identification, it was also from a scientific point of view a welcome contribution towards the knowledge of tropical butterflies. Here, and in some other places, notably in the *Iris*, Standinger described quite a number of new species and varieties of American Papilios, among which *hahneli*, *quadratus*, *tasso* and *garleppi* are the most noteworthy. We need not dwell here on Standinger's enormous influence on Palaearctic Lepidopterology, which was his chief interest; but it is only fair to mention that no other entomologist has had so great an influence on the exploration of the South American butterfly fauna as Dr. Standinger. A great many collectors and residents were encouraged and subsidised by him, among whom Dr. Hahnel and the Garlepps were the most successful. A large proportion of the American Papilios which one sees in collections are Staudingerian specimens. In systematics Standinger was guided more by the general appearance of the species, or by intuition, if we may say so, than by hard facts of morphology, and therefore was often led astray. However, he was far too keen an observer not to recognise some general truths in respect to relationship. He was the first to see that there is a difference between geographical and non-geographical varieties, and he endeavoured to distinguish even nomenclatorially between these two grades of varieties, calling the geographical variety *varietas* (*var.*) and the non-geographical variety *aberratio* (*ab.*) The distinction remained, however, more or less theoretical, Lepidopterists employing *var.* and *ab.* just as indiscriminately as before. This is one of the reasons why we reject *var.* altogether as a *special* nomenclatorial term. In another matter we have followed Standinger now for some years. In the Revision of the Papilios of the Eastern Hemisphere we altered, following precedent, all the adjective names of species and varieties into the masculine gender, *Papilio* being masculine. We

have since come to accept Standinger's view that every name should be treated as a noun, and therefore its gender be independent of that of the generic name. For us *Papilio oregonia* is as correct as *P. opalinus*.

Standinger was an ardent adherent of the habit of writing all names of Lepidoptera with a capital. One of his arguments for the correctness of this purely lepidopterological custom—in no other branch of Zoology have *all* the names ever been written with capital initials—was that Linné had employed capitals for all names of butterflies. In this Standinger was wrong, Linné having written with a small initial the few adjective names bestowed on butterflies (*dissimilis*, *assimilis*). We consider the writing of all specific and varietal names with small initials, and of generic names with capitals, as by far the most convenient method, generic and non-generic titles being at once recognisable as such. In contradistinction to the habit of capitalising all names (*Papilio Priamus*), there was early in the nineteenth century the method in vogue, especially among French authors, of writing both the generic and specific names with small initials—*papilio priamus*. Such matters are purely conventional. One ought to select that method which is the least confusing.

Among the literature on Nearctic Lepidoptera no works are so prominent as the *Butterflies of North America*, by W. H. Edwards (1868-97), and Scudder's *Butterflies of the Eastern United States and Canada* (1889). The plates issued by Edwards are nearly all of a quality hardly ever reached on this side of the Atlantic, nor have we any work in which the life history of the butterflies is so well illustrated. His greatest discovery among Papilios was the demonstration by breeding of the polymorphism of *Papilio bairdi* and of the seasonal variation of *P. mancellus*. Though in other places Edwards rather ridicules the idea of frequent occurrence of hybrids in nature, he explains nevertheless this polymorphism of *P. bairdi* by assuming that the insect is a product of hybridisation.

Scudder's *Butterflies* is the most intrinsic work written on Diurnals. No other work on Butterflies can be compared with it. The mass of morphological detail which was new is enormous, and, what is more, the facts were well digested, and not merely compiled and put together anyhow. But it was perhaps just this abundance of small characters which obscured the great distinctions in *Papilio* so much that Scudder did not clearly perceive the three main divisions of this so-called genus. It was left to Erich Haase to rediscover the three natural sections into which the Papilios of all regions are separated.

In his *Untersuchungen über Mimicry* (1893) Haase gives a classification of the Papilios which is in the main quite correct, starting from the three main divisions which Horsfield had defined in 1857. Many obscure points in relationship which had defied every other author were successfully solved. He was the first and has remained the only author who saw the close connection that exists between *Papilio ariarathes*, *harmodius*, *curyleon*, etc., on the one hand, and *Papilio protesilaus* and allies on the other. Those mimetic Papilios are placed everywhere in books and collections with *P. anchisiades*, or even *P. aeneas*, instead of with *P. protesilaus*, *marcellus*, etc. As a student of Mimicry Haase was aware that models and mimics are usually not nearly related, and this general knowledge may have guided him in the right direction.

The morphological distinctions advanced by Haase for the three main divisions of *Papilio* are only slight, and do not apply to all the species. We have endeavoured to give the classification a better morphological basis. The only serious mistake which Haase made in respect to American Papilios was the position he assigned to

Papilio hellanichus, placing this insect with *P. machaon*, as all other authors* had done, instead of close to *P. scamander*.

In Scudder's work, mentioned above, the genitalia of both sexes have to a certain extent been taken into consideration in distinguishing the species. Messrs. Goldman and Salvin followed that line of research, at least with the ♂ genitalia, details of which are figured of nearly all the Central American Papilios in their famous work, the *Biologia Centrali-Americana*. The female genitalia were only referred to cursorily in a few instances, inclusive of the bursa copulatrix, which was often found to be different in different species. It was the first faunistic work on tropical insects in which such researches were carried out. These researches have greatly advanced our comprehension of the true taxonomical value of these organs. The authors found the genitalia to be excellent guides, in many instances the sole trustworthy guides; but they recognised also that there are groups in which the genitalia do not present any tangible differences between the species, while in other instances the organs were observed to be variable. We commenced to work at this problem when the Revision of the Papilios of the Eastern Hemisphere was in preparation (1894). The main results, which we have since repeatedly verified in many groups of Lepidoptera, were published in 1896.† They may be epitomised as follows:

(1) The majority of species are different in the genitalia of both sexes, a small percentage only showing no distinctions in these organs. Among American Papilios *P. ariarathes* and allies cannot be separated by these organs with certainty, and *P. bairdi* and *polyzenes* appear to be identical in the genitalia.

(2) About half the number of geographical forms are more or less distinctly different in the genitalia, at least in the males, the differences being often found to be entirely bridged over by intergradations.

(3) There is always a certain amount of individual variability in the genitalia. Specimens abnormal in these organs also occur. It requires, therefore, often a series of dissections to arrive at a correct estimate of the distinctive characters presented by the genitalia. There is no individual dimorphism in these organs connected with the dimorphism in pattern or colour. The only seasonal dimorphism we have come across, though a great number of seasonally dimorphic species have been examined, is found in *P. xuthus*, the spring specimens (from hibernated pupae) differing slightly and not quite constantly in the harpe from the summer specimens. No such difference obtains in the seasonally dimorphic *P. marcellus*.

It will be observed that the differences in the genitalia, though generally less variable than those of colour and pattern, and often much more striking than wing-differences, require in each case the same careful investigation as colour and pattern, before their true taxonomic value can be pronounced upon. A difference in the genitalia may be specific or varietal, just like wing-differences.‡

A number of American Papilios have been dealt with by Eimer in his treatises on *Artbildung und Verwandtschaft bei Schmetterlingen* (1889 and 1895). These essays are of a philosophical nature. As contributions towards Papilio-systematics they are a failure, the researches not having been intrinsic enough to

* Burmeister, in 1878, placed *hellanichus* near *scamander*. It appears that he assigned the right position to it only because he identified it erroneously with *cleotas* Gray (1832), which was known to be a near relative of *scamander*.

† "Mechanical Selection," in *Nov. Zool.* iii. pp. 426—525 (1896).

‡ P. Born has arrived at similar results from a study of the forecups of *Carabus* (see *Insekten-Börse* xvii. (1900) and ff.).

warrant the majority of the conclusions. The essays suffer also greatly from verbosity. Nevertheless we may say (with some poet) that mistakes are often more instructive than facts. The name *mediocauda* introduced by Eimer for a specimen of *P. polyxenes* without locality has been overlooked by subsequent authors, not being mentioned in the catalogues of Nearctic Lepidoptera. The specimen without home might better have been left also without a name.

It has been the object of the present Revision to correct to the best of our ability the mistakes contained in the literature on the American Papilios, and to broaden the morphological basis of the systematics of these insects. We have widened the scope of research as far as the material permitted, and therefore we have arrived in many cases at a clearer insight into the relationship of the Papilios with one another than if we had followed the customary methods of investigation. We hope to be pardoned for not having solved every knotty point.

The most interesting general result of our researches is perhaps the demonstration of geographical variability in secondary sexual characters apart from the genitalia. The occurrence of such variability is of great bearing on systematics, since many authors consider secondary sexual differences to be of generic value. The remarkable difference obtaining in the scent-scales of some species which are otherwise very similar (see *P. protesilaus* and allies) is also noteworthy. Since we shall have to discuss the general questions as to distribution, relationship and evolution of the *Papilionidae* in our proposed essay on the classification of the family, we abstain here from entering on such problems. For the same reason we have restricted the illustrations of details of structure as far as it was possible without serious injury to the lucidity of the descriptions. We have further abstained from describing in detail the various known species and varieties, but have given at least some principal feature of each form in order to enable the reader who is not in possession of the literature quoted to determine his specimens from this Revision. The keys to the groups and species will, we venture to hope, also be found useful. The groups of species have been defined only from the American species which they contain. These groups are not all of generic value. We hope nobody will find it necessary to propose generic names for them. The extent of some of the groups may be considerably altered in our proposed generic revision by the inclusion of Old-World forms. Besides, Hübner and Moore have already supplied a great number of generic names for Papilios, the diagnoses given with the names being of the most superficial kind, and those of Moore, moreover, often very faulty. It is common knowledge that the delimitation of genera in cosmopolitan families cannot well be based on the limited number of species occurring in a single faunistic district. Classification has always suffered from the habit of systematists of studying the systematics of a district rather than concentrating their labours on certain families, taking into account all the species of the globe.

The treatment of the matter embodied in this Revision requires a few more remarks. We are in favour of simplification of nomenclature. Every simplification which is consistent with the object of nomenclature should be welcome to the systematists, whose labour suffers from unnecessary nomenclatorial complications. One such simplification is to write in the text, headings, and in the synonymy all specific and varietal names with small initials, and the names of higher classificatory categories (subgenus, genus, subfamily, etc.) with capitals, no matter whether they were thus written or not by the authors quoted. We consider it utterly indifferent,

whether Lucas wrote *Papilio orbignyana* or *papilio orbignyana* or *Papilio Orbignyana*. Such outside matter does not in the least affect the natural history of the insect thus designated. *Papilio orbignyana* is the most convenient form of spelling, and is therefore here adopted in every case. We have also simplified, as in former essays, the spelling of dedication-names standing in the genitive form ending in *i*. The authors of such names are very inconsistent in the spelling of the names. We find *birchallii* and *dunati*, *blumci* and *latreillii*, *wallacei* and *wallacii*, *bairdii* and *brucei*, *lorquini* and *lorquini*, *kirbii* and *kirbyi*, etc. One cannot possibly remember what in each case the original spelling of such a name was. If one has to write the name, one has to look up the original description. But is it really necessary to stick to this inconsistency and this burdensome variety in spelling? We think not, since uniformity can be arrived at without the slightest difficulty. However, what is an unnecessary burden in nomenclature should certainly be dropped. We write these dedication-names with one *i* added to the name of the person, *wallacii*, *Wallacii*, *wallacei* and *Wallacei* being all reduced to one form, *wallacei*. That such a simplifying principle is really opportune is best shown by the fact that, in consequence of the general arbitrariness in spelling the ending of dedication-names, the name of a new form spelt *drucei* will invariably be written by some later author *drucci*; or if the name was written originally *drucci*, the spelling *drucei* will surely also crop up. As we treat names like *androgeos* and *androgeus*, *polydamas* and *polidamas* as being different, *brucei* and *brucei*, or *westwoodi* and *westwoodii*, or *kirbii* and *kirbyi* would be rather embarrassing without the foregoing principle of simplification which renders such names uniform. For similar reasons the German *ä*, *ö*, and *ü* (which were originally *ae* = *ä*, *oe*, *ue*;) have been changed into *ae*, *oe*, and *ue* in all names.

About the naming of forms below species there are many different opinions. All agree that what an author considers to be a "species" should bear a name. But one may very well ask, is it necessary to give names also to the various categories of varieties? The answer depends on what is the object of naming. Linné invented his binominal formula for the species with the purpose of reducing chaos to order. However, if we agree that for the sake of lucidity in studying the species of each genus it is necessary to have a special name for each species contained therein, it follows that in researches on the varieties which compose each species names are likewise required for these varieties. Now, is the study of these varieties essential enough for systematics to warrant the introduction of names for the enormous host of varieties? With many authors systematics have been and are essentially a description of the differences of "species." The knowledge of these differences is certainly in each case essential; one cannot do without it. But it is not the final aim of systematics as part of the science of life. A collector learns to know the various "species" by handling them, just as a child learns to know a language by practice. When once a candidate who spoke and wrote French and English fluently, having resided in these countries for a number of years, presented himself for examination *pro facultate docendi* at a German University, the professor of modern languages gave him the advice to become foreign correspondent in a mercantile house, since he had no philological knowledge at all. And similarly a professor of zoology once said to a candidate for the degree of Ph.D. who could and did boast of knowing by heart practically all the vertebrates and a large proportion of the invertebrates of Central Europe: "That is very good; if you now study Zoology for a couple of years I shall be pleased to accept you as a candidate."

Both professors were perhaps a little sarcastic. Nevertheless there is a good deal of truth in what they said. The describing and catalogning of "species" are certainly the basis of systematics, but also the lowest degree in this science. After that comes classification, or in other words, research in relationship. To have a sound basis in this research one has to start from the individuals which are blood-related, and work upwards to the species. The individuals composing a species have each some peculiarity. This individual variability, however, is not everywhere indiscriminate. The individuals are in many instances found to fall into different groups characterised by some corporeal distinction. These are the varieties of which a species is composed. If the species are the product of evolution, the commencement of the splitting up of one species into more must be found among the varieties. The study of the varieties is, therefore, a study of the origin of species, or the relationship of species with one another; from which follows that the classification of species according to their relationship depends on the study of varieties. However, if the study of varieties is essential for the classifier, varieties have as much a claim to a precise nomenclature as the species. If we speak, for instance, of *Papilio thoas* from Cuba, *P. thoas* from the Guianas, *P. thoas* from Brazil, etc., all we gather is that *Papilio thoas* occurs in these different districts. On the other hand, if we write of *Papilio thoas oriado* from Cuba, *P. thoas thoas* from the Guianas, *P. thoas thoantiades* from Argentina, etc., we perceive at once that the species *P. thoas* has developed into a number of different varieties, and we are able to discuss these varieties and their bearing on the general questions of evolution without having constantly to repeat the localities where each variety occurs, *P. thoas cinyras* being a decidedly more convenient term than "the variety of *P. thoas* from the Upper Amazons, Peru, and Bolivia."

The varieties fall into three categories: the geographical, the seasonal, and the individual variety; the last two being the lower grade variety, and the first the higher grade variety. This distinction between a lower and a higher grade of varieties has been habitual with most entomologists for over a century. It was Esper who first made the distinction. He dealt with variability in a far more philosophic spirit than any contemporary systematist. In his essay *De varietatibus* (1781) he says, p. 18:

"In pluribus generibus species iterum subdividi jubet copia et proxima earum affinitas. Essentiales quibusdam insunt characteres, diversitatem in ipsa specie constituentes, quos in aliis pro accidentibus habere debes. Illas *subspecies*, has meras *varietates* appellandas censeo, de quibus nunc uberius quid constet est dicendum.

§ XIV.

"*Subspecies* (Untergattungen, Races *) quae vulgo annumerantur varietatibus, plane ab his sunt separandae. Originem ex speciebus duxisse, perfectissima in his declarat partium essentialium similitudo. . ."

We have accepted Esper's term *subspecies* for the essential variety—namely, that kind of variety which is an incipient species. For an incipient species no better term could have been coined than *subspecies*. According to our researches the incipient species is represented by the geographical race. As no other variety forms the basis of the development of a species into several species, the term *subspecies* is employed by us for nothing else but the geographical variety. Since

* Esper's "Gattung" means, of course, what is now called a species, "was sich gattet."

the contrast existing between the geographical variety (= subspecies) and the non-geographical variety (= individual and seasonal forms) has been demonstrated recently in Lepidoptera in another place,* we mention here merely that the combination of characters in a subspecies is essentially the same as in a species, the difference being one of degree more than of kind. An overlapping of characters often takes place in subspecies, showing that these races have not attained to that kind of complete separation which exists between sympatric species.†

In dealing nomenclatorially with the varieties it appears to us highly advisable to emphasize also in the nomenclatorial formula the contrast which exists between the essential variety, or the subspecies, and the lower-grade varieties. This, we think, is best attained by the formula first employed for the geographical race by another lepidopterist, Drury, in 1773, and adopted during the last twenty years by a great many systematists. In this formula the name of the subspecies follows directly after the name of the species, just as this comes immediately after the name of the genus, no explanatory term, subsp. (= subspecies), or var. geogr. (= *varietas geographica*), or anything of that kind being put in between the specific and subspecific names: *Papilio polyxenes americus* meaning *Papilio polyxenes* subsp. (= var. geogr.) *americus*. Entomologists appear to be rather reluctant to adopt this simple Druryan formula.

However, we repeat that the main point is not the nomenclatorial formula by which species and varieties are recorded, but the recognition of the existence in nature of species contrasting with a higher grade of variety (subspecies = geographical race), and this contrasting with a lower grade of variety (seasonal and individual forms). Linné rendered chaos into order; let it be the duty of the modern systematist to follow him by bringing order into the chaos of varieties.

A geographically variable species consists of at least two subspecies. For instance, the Colombian specimens of *Papilio bachus*, which species occurs from Colombia to Bolivia, are different from the more southern individuals. We have therefore a northern and a southern subspecies. The opinion still held by many collectors and describers that the Colombian form is the "species" (the "Stammart" of German describers), because Felder gave a name to it some forty years ago, while the more southern form is the "variety of it," on account of its name being of a later date, should be abandoned as utterly unscientific. All the subspecies, inclusive of the first described one, are co-ordinate; the entire series of (two or more) subspecies is the species.‡

As regards the nomenclature of subspecies we have first to repeat that, if the stability of names is one of the principal aims of nomenclatorial rules, the first name given to any member of a species must be adopted as the name of the entire species. For instance, though Linné described the black female of a Nearctic Swallowtail as a

* "Der Gegensatz zwischen geographischer und nichtgeographischer Variation," in *Zeitschr. Wiss. Zool.* lxxxiii, pp. 151—210 (1905).

† The principal criterion of the conception "species" is that species can exist together without fusing, no other barrier keeping them apart than their own organisation.

‡ Lorenz, in 1892, called the series of subspecies constituting a species the *Formenkreis* of this species. A *Formenkreis* is therefore the same as our species. The term *Formenkreis* is very convenient. Unfortunately it has later been employed by Herr Kleinschmidt in a slightly widened sense, closely allied species being sometimes included in the *Formenkreis*. In this sense the *Formenkreis* is a kind of half-caste between species and subgenus, and the Linnean binominal specific formula being employed for it by Kleinschmidt obscures the distinction between species and non-species. The older definition of the term by Lorenz was precise, correct, and has priority; there is therefore no reason for modifying the meaning of the term.

species different from the male, the name *glaucus*, given to that kind of female only, is the name of the entire species. Similarly, though only the male of an Amboina *Papilio* was named *priamus* by Linné, the female being described by him as a different species, the name of the species is *priamus*. In neither case is a *new* name necessary or permissible. In a great many instances different individuals (sexes or otherwise) have been described as separate species. The first name given to any specimen is the name for all, however restricted the original application of the name may have been. It appears to us further self-evident that the philosophic conception which an author may have of "species" or "variety" cannot be permitted to affect the name of the forms, which are realities in nature. Whether we believe that *Papilio machaon* is the product of a special act of creation or the product of evolution; whether we believe that the various varieties from the Old and New World constituting the species *machaon* are evolved from an ancestral homomorphic created species, or that each variety has been created as such; whether we believe that the species is the product of evolution by slow degrees, or *per saltum*, by Natural Selection, or by the direct influence of external conditions, etc., etc.; all such differences of opinion cannot be allowed to overthrow the name *machaon* for this species of Swallowtail, unless one wishes nomenclature to become chaotic. In the same way, the subspecies (= geographical race) takes that name which is the first given to a member of this subspecies, whatever conception the author of the name may have had of the individuals so named. Since *glaucus* was the first name for a specimen of a Nearctic Swallowtail, it is the name for the southern subspecies to which that specimen belonged, as well as the name for the entire species. The formula for this subspecies is therefore *Papilio glaucus glaucus*.* This formula is precise, showing at one and the same time that the species is geographically variable, and that the particular subspecies thus designated was the first one of that species of which a specimen, or specimens, received a name.

The number of systematists who object to having special names for subspecies appears to be very small as compared with those who deal with subspecies, at least

* In the Revision of the Papilios of the Eastern Hemisphere, the first described subspecies was termed *forma typica*, as it was nomenclatorially the typical form, giving the name to the species. At the end of the Introduction to that essay I stated that it is wrong to call the first-named form the "species" and the later-named forms subspecies of it, but that one ought to treat the first-described form as a subspecies like the others, "so that one could speak of *P. eurypylus* L., meaning the entire species with all its subspecies, and of *P. eurypylus eurypylus* L., *P. eurypylus lycæon* Feld., *P. eurypylus pauphyllus* Feld., *P. eurypylus mihado* Leech, etc., meaning the local races." The proposal did not meet at that time with the approval of the co-editors of *Nov. Zool.* Subsequently, when I worked out the idea, I found that Dr. Lorenz had already given expression to the same view some years previously (1892) in very lucid language. In 1895 I had no knowledge that I had been anticipated by Lorenz; but it has since dawned upon me that I have nevertheless little claim of having invented the formula *P. eurypylus eurypylus* independently of former authors. One is apt to forget where one's ideas originally came from. In the *Catalogus Colopterorum* by Stein and Weise, which was one of my treasures when a schoolboy, I found a sample of nomenclature which was at first very puzzling to me. Under the species *Carabus schiedleri* (of course written with a capital *S* in the *Catalogus*) there was a whole string of varieties, one of which was named var. *schiedleri*. When I came to understand the meaning of this formula *Carabus schiedleri* var. *schiedleri* I was much impressed with the wisdom of thus designating the first-described variety in contrast to the whole species to which it lends the name. This impression, I think, expressed itself in 1895 in the formula *P. eurypylus eurypylus*.

We have some hope that entomologists will sooner or later all follow the *Catalogus* of Stein and Weise, not only in this particular instance, but carry out consistently the nomenclature exemplified by *Carabus schiedleri* var. *schiedleri*, at the same time dropping the misleading and unnecessary "var." in the case of subspecies (= geographical races), calling the English *Carabus arvensis* by the concise formula *Carabus arvensis anglicus*.—K. J.

nomenclatorially, as if they had the rank of species. Nor can the former view be justified. There would be much more justification in rejecting names for the lower grade varieties. However, entomologists on the whole appear to be inclined to multiply names for individuals characterised by some striking peculiarity. Now, it seems to us obvious that it is impossible to provide consistently a name for every peculiarity and combination of special characters observed in the specimens, since every individual differs to some extent from every other, and as, further, an individual may agree with a second in some peculiarity and with a third in some other character, and would have to receive two names. The number of individuals is endless. The number of names cannot possibly be allowed to be so. Therefore, restriction in naming individuals is absolutely necessary. We believe the most sensible way of dealing with the range of individual variability, apart from marked dimorphism, is that of employing, instead of *names*, descriptive morphological terms which would cover the corresponding individual varieties of all the nearly and distantly related species. One might have, for instance, one term for all individuals of *Papilio* which have yellow spots instead of the normally red ones, and another term for the aberrant individuals which have these spots white. This method has been advocated by various authors, and we think will ultimately be adopted. For a study of variation this method is certainly better adapted than that of giving an unlimited number of names to individuals. For a specimen can bear only one **name**, though the individual may have many peculiarities in pattern, colour, and structure; while by the other method it would be possible to refer to each peculiarity by a special morphological term if necessary. For instance, one and the same specimen may be diminutive, tailless, diffuse in markings, xanthochromatic, heterographic right and left, etc.; these peculiarities could not all find expression in a **name** given to the specimen. However, the method requires careful working out before it can be successfully applied in all groups.

We have considered it sufficient in this Revision to have special names for seasonal forms, and for the forms of conspicuously di- or trimorphic species respectively subspecies, also in the case of this di- or trimorphism obtaining in one sex only.

Bearing these explanations in mind, the reader will not find any difficulty in understanding the system of nomenclature employed.

A fairly large number of subspecies and a few species are here described for the first time, and we feel sure that there are a good many new ones yet undiscovered in those parts of South and Central America and the West Indies which are not exhaustively explored. The species and subspecies which are represented in collections by uniques or by very few specimens is suspiciously large, always a sign of the incompleteness of our knowledge of the fauna of the respective districts. The interior of Brazil, especially the province of Goyaz, is still a good field for a collector. The districts north of the mouth of the Amazons are also practically untouched by entomological collectors, not to speak of the mountains at the boundary of the Guianas. West and North Peru, the north coast of Colombia, the Atlantic side of the Volcano de Chiriqui, the mountains of Costa Rica, West Mexico, and especially the island of Haiti (and S. Domingo) will doubtless yield interesting results to a competent explorer; and the swamps of the Amazonian region may still harbour some unknown species allied to *Papilio triopas, aeneas* or *certumnus*.

The Papilios, inclusive of the so-called genns *Troides* (= *Ornithoptera*), fall into three natural groups, which are sharply separated in the larval, pupal and imaginal stages. This classification was given by Horsfield in 1857 for the Indo-Malayan Papilios (in Horsf. & Moore, *Cat. Lep. Ins. Mus. E. I. Comp.*), being based almost exclusively on larval characters. Haase, in 1893, recognising the soundness of the classification, applied it to all Papilios, separating them correctly into the three Horsfieldian groups. Investigation in the classification of the Papilios must start from these primary divisions, as we have repeatedly insisted upon. The recent attempts by Moore* and Kirby† to divide up the mass of Papilios into small genera have proved to be more or less abortive, the three large natural sections not having been recognised by these authors. We find consequently united in one genus models and mimics which belong to different main groups, in Kirby's genus *Ithobalus* all three main groups being represented.‡

A detailed description of these primary Sections will be given in our proposed generic revision of the *Papilionidae*. The following short synopsis, we think, will suffice for the present :

I. *Aristolochia*-Swallowtails ; p. 435.—The larvae feed on *Aristolochia*, occasionally on allied plants. They are densely covered with minute hairs, which give them a velvety appearance, the head, prothoracic plate and the thoracic legs remaining glossy ; each segment bears a belt of tubercles, which vary in length according to species, but are always fleshy, being covered with fine hairs like the body, never with heavy spines, one of the tubercles standing beneath the stigma and another above the legs.—The proximal abdominal segments of the pupa are depressed dorsally, and, like the wing-cases, dilated laterally, the pupa being much more broadened in the centre than in the other two Sections of *Papilio* ; on each side of the abdomen there is dorsally a row of tubercles or flaps, sometimes forming a nearly continuous crest.—The antennae of the imago is not scaled, and appears to the naked eye less distinctly segmented than in the other Sections of *Papilio*, on account of the segments not being much compressed or constricted at the base ; each segment bears a sensory groove ventrally at each side, the grooves being in most species of this Section deep and ovate (remining one of the Nymphalid antennae) ; the sensory pores on the dorsal side of the segments are rather large. The arrangement of the spines on the tarsi is also characteristic for this Section ; the outer ventral row of spines (there are normally four ventral rows in *Lepidoptera*) is not separated by a sharply defined, spineless, impressed space from the spines of the dorsal surface, as is the case in the other two Sections.

The American species are distinguished from the Old-World forms by the sinus of the fifth tarsal segment in which the claws are inserted being much less extended. This Section is not represented on the African Continent, only one species occurring on Madagascar, while the species are numerous in the Oriental Region and in America.

II. Fluted Swallowtails ; p. 537.—The larvae are without tubercles, or the tubercles are hard and bear spines (for instance, in the Oriental species *aegcus*, *anaetus* and *clytia*) ; the third thoracical segment is enlarged, the larva therefore

* *Lepidoptera Indica* v. (1901-3).

† Hübner, *Samm. Exot. Schmett.* ed. ii. (190—; year ?).

‡ *Ithobalus* as conceived by Hübner in 1818 (?) contains only species which are really closely allied with one another. The exponents of Mimicry will doubtless be glad to see that mimics have managed to deceive such old hands at *Lepidoptera* as Kirby and Moore.

tapering in front and also becoming almost gradually thinner backwards.—The chrysalis is more or less strongly ringate, often resembling a piece of wood; the head and thorax are usually curved upwards as in the preceding section, but not so strongly, being almost straight in certain species (for instance, *elytia*).—The antennal segments are more or less narrowed at the bases and somewhat compressed; the fine sensory hairs are either ventrally concentrated in a patch on each side, there being no distinct grooves as in the preceding Section, or the hairs cover nearly the whole ventral surface. There is no scaling on the antenna, except at the extreme base. The tibiae are never incrassate in the ♂, as they often are in the *Aristolochia*-Swallowtails; the ventral spines of the tarsi are separated from the dorsal spines by a regular, somewhat impressed, spineless interspace. The abdominal margin of the hindwing is always curved downwards, having the appearance of being fluted beneath, the two sexes resembling each other in this respect, while in the males of the two other Sections the abdominal margin is usually modified, bearing nearly always a distinct scent-organ.

This Section comprises the majority of the *Papilio*s. It is less homoeomorphic than the preceding Section. Many species are mimetic.

III. Kite-Swallowtails; p. 654.—The most characteristic forms of this Section somewhat resemble a paper kite (for instance, *dorcus*, *antheus*, *protesilaus*).—The third thoracic segment of the larva is enlarged, as in the preceding section; the thoracic segments and the anal one bear often spinelike tubercles, the anal spines standing close together: in other forms the tubercles are absent or vestigial, traces of tubercles being usually found on all segments. There are no eye-spots or oblique bands, the pattern consisting of small dots, or several transverse lines (belts) on each segment, or more or less irregular longitudinal bands.—The chrysalis is more smooth than in the other Sections; its head and thorax are hardly at all curved upwards. The mesonotum bears a pyramidal projection which is carinate in front and behind and at the sides. The lateral carina is continuous with the carinate edge of the sheath of the hindwing. The abdomen bears dorsally two carinae which converge in front and behind, the anal segment being longer than broad and almost regularly pyramid-shaped.—The antenna of the imago has a more distinct club than in the previous Sections (which is noticeable already in the chrysalis). The upperside of the antenna and the tibiae and tarsi are scaled, but the scales fall off easily in most species. The arrangement of the tarsal spines is as in the previous Section. The tibiae are never incrassate in the males. The abdominal margin of the hindwing is widened in the males and bears usually a distinct scent-organ. The scaling of the wing is often less dense than in the previous Section, the wings becoming transparent distally. In a large proportion of the species the first, or the first and second subcostal veins of the forewing are anastomosed with the costa, which does not occur in the other Sections, and the cell of the hindwing is narrow in most cases, the cross-vein D^1 (in the third cellule) being more or less strongly incurved.*

The Section is cosmopolitan, like the preceding, but goes less far north and south, being essentially tropical. The mimetic American species are all characterised by red spots situated at the base of the wings on the underside, either on both wings or on the hindwing only.

* For explanation of neuriation see diagram after Species No. 169.

SECTION I.—ARISTOLOCHIA-SWALLOWTAILS.

The following generic or subgeneric names have American species as types :

Parides Hübner (1818 ?) ; type *echelus*.

Ithobalus Hübner (1818 ?) ; type *polydumas*.

Endopogon Lacordaire (1833) ; type *sesostris*.

Blakea Grote (1875) ; type *columbus* (= *gundluchianus*).

Lacordaire (*Ann. Soc. Ent. France* ii. p. 384) gives Eschscholtz as author of the name *Endopogon*. We do not know when and where Eschscholtz proposed the name.

The American *Aristolochia*-Swallowtails fall into two very distinct subsections.

SUBSECTION A.*

Antenna long ; club slender ; sensory grooves more or less large, sharply defined ; end segment conical, almost as long as it is broad. Claws asymmetrical. Markings of body red. Hindwing usually with red band or row of red spots on disc, these markings seldom white or yellowish white. Forewing of ♀ bearing often white or yellowish white patches on disc and in cell, being sometimes all black. Subbasal cellule long, widening distally ; PC curved near its base. Cross-veins of forewing oblique ; upper angle of cell obtuse. Cell of hindwing more or less acuminate, D³ more or less leaning basad anteriorly, the cell-angle D³—D¹ being smaller than the angle D²—D³, or vein D³ reduced to a point, rarely transverse, never leaning distad.

♂. Scent-organ woolly or densely scaled, no naked streak at its discal side. Tenth abdominal sternite not reaching to the apex of the long and slender tergite. Tibiæ often incrassate and hairy.

♀. Anal segment with numerous hairs and bristles which are mostly tapering to a fine point, others ending abruptly, being somewhat thicker at the tip than at the base ; in many species there are some bristles which are distinctly club-shaped.

The American species which come here can be conveniently placed into three groups.

Key to the groups :

Fringe-spots white. Hindwing with submarginal spots and usually also discal spots or dots, or a discal band ; mostly with tail *Ascanius Group*.

Fringe-spots white. Palpus black or red. Hindwing with discal band or row of spots, but without submarginal spots *Aeneas Group*.

Fringe-spots red. Palpus always black. Hindwing marked as before *Lysander Group*.

I. *Ascanius Group*.

In the preservation of a row of submarginal spots on the hindwing this group is more ancestral than the other American *Aristolochia*-Swallowtails. The forewing of some species, especially *columbus*, shows also ancestral characters in pattern. The tail of the hindwing is a third generalised peculiarity, which is more strongly and more generally developed in this group than in the other two groups of red-spotted species.

Key to the species :

- a. Forewing with green-blue band on forewing Species No. 1.
- Forewing with white band on forewing b.

* Subsection B. follows after Species No. 45.

- Forewing without band (or only a trace of it) *f.*
b. Band of hindwing partly red Species No. 2.
 Band of hindwing entirely white *e.*
c. Band of forewing angulate at lower angle of cell, red anal
 spot of hindwing very large Species No. 3.
 Band of forewing practically straight *d.*
d. Palpus red *e.*
 Palpus black Species No. 7.
e. Submarginal spots of hindwing sandglass-shaped Species No. 5.
 Submarginal spots of hindwing transverse, oblong or luniform
 Species No. 4.
f. One row of spots on hindwing *g.*
 Two rows of spots on hindwing *h.*
g. Fringe of forewing completely white or very slightly interrupted
 at the veins Species No. 6.
 Fringe of forewing uneven, spotted with white Species No. 11.
h. Forewing with a white dot on disc; central submarginal
 spots of hindwing slightly curved Species No. 10.
 Forewing without white discal dot; central submarginal
 spots of hindwing strongly arched; discal spots red Species No. 8.
 As before, but discal spots of hindwing small, more or less
 white Species No. 9.

1. *Papilio columbus* H.-Sch. (1862).

- Papilio columbus* Herrich-Sch., *Correspbl. Zool. Min. Ver. Regensb.* xvi. p. 141 (1862) (Cuba); id.,
l.c. xviii. p. 173 (1864).
Papilio gundlachianus Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 294. n. 75 (1864) (nom. nov. loco
 "columbus H.-S."); id., *Reise Novara, Lep.* p. 137. n. 101. t. 27. fig. 1. 2 ♂ (1865); Herr.-Sch.,
Prodr. Syst. Lep. ii. p. 20 (separ.) (1867); Kirby, *Cat. Diurn. Lep.* p. 536. n. 120 (1871); Gundl.,
Papilio i. p. 113 (1881) (Cuba); id., *Contr. Ent. Cubana* p. 124 (1881) (Eastern Cuba); Honr.,
Sitzber. Berl. Ent. Zeit. xxx. p. 4 (1886); id., *Berl. Ent. Zeit.* xxx. p. 131. t. 5. fig. 5. ♀ (1886);
 Bonzon, *Trans. Amer. Ent. Soc.* xv. p. 293 (1888) (larva); Haase, *Untersuch. Mimicry* p. 77 (1893).
Papilio groti Blake, *Proc. Ent. Soc. Philad.* iv. p. 313 (1865) (Cuba).
Blakea gundlachianus Grote, *Trans. Amer. Ent. Soc.* v. p. 118 (1875).

As this *P. columbus* of Herrich-Schaeffer belongs to quite a different division of the subfamily *Papilioninae* than *P. columbus* of Kollar and *P. columbus* of Hewitson, we employ that name for the present species, instead of the later name *gundlachianus*, according to our rules of nomenclature.*

The species comes close to the Brazilian *P. ascanius* and *agavus*. The tibiae of the male are hardly at all incrassate, bearing bristles and numerous small hairs. The blue scales of the wings are entire, while the scales in the costal area on the upperside of the hindwing and in the posterior area on the underside of the forewing are dentate as in the allied species. The anal submarginal spot M²—SM² of the hindwing is absent from the upperside, being small and short on the underside. As a remnant of a discal band there are on the underside of the hindwing three or four white bars proximally of the red spots. The distal edge of the forewing is dotted with white, as in the *Aeneas* Group.

Scent-organ as in *P. agavus* and allies.

Genitalia in general structure as in *P. agavus* and allies, but characteristically modified.—♂. Clasper short, rounded ventrally, the inner surface deeply concave,

* See p. 423.

the hairy ventral margin very broad distally, being at the apical third nearly half the width of the entire clasper; this hairy convex area gradually widening apicad; dorsal margin of clasper emarginate, the apex acuminate, slightly pointing upwards. Harpe elongate, narrowest in middle, lying flat on the clasper, being curved upwards distally; ventral edge denticulate proximally; this proximal portion dilated into a rounded or acuminate lobe, which is directed obliquely basad and ventrad; apical lobe rounded off, denticulate. Tenth tergite very slender, slightly incurved in middle. Penis-sheath acuminate, a disc-like piece of chitin projecting ventrally from the orifice as in *P. agavus*.—♀. In non-virgin specimens the vaginal area covered with a hardened substance, which is whitish and has a spongy appearance; this coital substance has no such definite shape as in *P. proneus*, but it is always constricted in the middle and there are also several holes or grooves, which are more or less in the same place in different specimens. In virgin individuals a broad central process is visible without dissection; this process stands behind the vaginal orifice, being somewhat curved, subacuminate, convex on proximal side, hollowed out on hinder side. In front of the vaginal orifice there is a heart-shaped lobe covered with minute hairs.

Larva described by Bonzon, *l.c.*

Hab. Eastern districts of Cuba, especially plentiful in the hills near Santiago de Cuba.

In the Tring Museum 14 ♂♂, 9 ♀♀, from: Sardinero, Santiago, January 1904 (Wirt Robinson); Gibara (Tollin).

2. *Papilio ascanius* Cram. (1775).

Papilio Eques Trojani ascanius Cramer, *Pap. Exot.* i. p. 20. t. 14. fig. A (1775) (Rio de Janeiro); Goeze, *Ent. Beytr.* iii. 1. p. 42. n. 14 (1779); Fabr., *Spec. Ins.* ii. p. 2. n. 6 (1781) (Brazil); Drury, *Illustr. Exot. Ins.* iii. p. 11. t. 9. fig. 1 & Index (1782) (Rio de Janeiro); Jabl. & Herbst, *Naturs. Schmett.* ii. p. 148. n. 36. t. 13. fig. 3 (1784); Fabr., *Mant. Ins.* ii. p. 2. n. 7 (1787); Gmelin, *Syst. Nat.* i. 5. p. 2226. n. 274 (1790); Jung, *Alphab. Verz. Schmett.* p. 57 (1791); Fabr., *Ent. Syst.* iii. 1. p. 3. n. 8 (1793).

Menelaides ascanius, Hübner, *Verz. bel. Schmett.* p. 85. n. 871 (1818?); id., *Samml., Exot. Schmett.* ii. t. 105 (1822?).

Papilio ascanius, Godart, *Enc. Méth.* ix. p. 73. n. 138 (1819) (Brazil); Lucas, *Lép. Exot.* p. 31. t. 16. fig. 1 (1835) (Brazil); Boisd., *Spec. Gén. Lép.* i. p. 306. n. 141 (1836) (Rio de Janeiro; North Brazil); Drury, ed. Westw., *Illustr. Exot. Ins.* iii. p. 11. t. 9. fig. 1 (1837) (Rio de Janeiro); Dunc., in Jard., *Nat. Libr.* xxxvi. p. 101. t. 3. fig. 1 (1843); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 13 (1845) (Brazil); Lucas, *Lép. Exot.* ed. ii. p. 31. t. 16. fig. 1 (1845); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 190 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 42. n. 217 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 58. n. 230 (1856) (Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 5. n. 73 (1857) (Brazil); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 294. n. 73 (1864) (S. Brazil); Butler, *Cat. Diurn. Lep. descr. Fabric.* p. 236. n. 9 (1869) (Brazil); Kirby, *Cat. Diurn. Lep.* p. 536. n. 117 (1871); Capronn., *Ann. Soc. Ent. Belg.* xvii. p. 9. n. 5 (1874) (Icaraby, Aug.; Botafogo, Nov.); Burm., *Descr. Rép. Argent. v. Lép., Atlas* p. 8. n. 20 (1879) (descr. of egg, larva and pupa; Rio de Janeiro); Oberth., *Et. d'Ent.* iv. p. 77. n. 249 (1880) (Brazil); Staud., *Exot. Tagf.* p. 14 (1884) (Brazil); Haase, *Untersuch. Mimicry* i. p. 77 (1893); Bönnigh., *Verh. Ver. Nat. Unterh.* ix. p. 27 (1896) (Rio de Janeiro).

Hectorides ascanius, Hübner, *Samml. Exot. Schmett.* ii. t. 105. ♀ (1822?); Kirby, in Allen's *Nat. Libr., Lep. Butt.* ii. p. 270. t. 65. fig. 1 (1896); id., in Hübner, *Samml. Exot. Schmett.* ed. ii. p. 89. t. 318. fig. 3, 4 (1905?*)

♂♀. Median band very broad on both wings, wider in female than in male, washed with red on hindwing, traversing apex of cell on forewing, but usually not

* The new edition of Hübner is being issued in parts, no year of publication being given, even with the new text written by Kirby.

reaching quite across cell. The band of the forewing nearly the same in position as the blue-green band of the Cuban *P. columbus* (= *gundlachianus*); some males have obscure white spots distally of apex of cell, while in some females these spots, as well as a triangular streak situated before cell, are quite distinct; in one of our females the band extends basad to point of origin of M^2 , being very broad also on hindwing. The anal submarginal spot is completely merged together with the anal spot of the discal band in most specimens, but in some individuals there is a separate submarginal anal bar distally of the last patch of the band.

Genitalia scarcely different from those of *P. chamissonia* and *perrhebus*; harpe proximally a little wider.

Early stages described by Burmeister, *l.c.*

Hab. Rio de Janeiro.

In the Tring Museum 13 ♂♂, 4 ♀♀.

3. *Papilio agavus* Drury (1782).

- Papilio Eques Trojanus lysander* Fabricius (*non* Cramer, 1775, err. det.), *Gen. Ins.* p. 251. n. 23-4 (1776) ("India," Dr. Fothergill.—Mutilated specimen of this species?); Goeze, *Ent. Brytr.* iii. 1. p. 45. n. 29 (1779); Fabr., *Spec. Ins.* ii. 9. n. 33 (1781); id., *Mant. Ins.* ii. p. 3. n. 20 (1787); Gmelin, *Syst. Nat.* i. 5. p. 2229. n. 285 (1790); Jung, *Alphab. Verz. Schmett.* p. 338 (1791); Fabr., *Ent. Syst.* iii. 1. p. 9. n. 25 (1793).
- Papilio Eques Achivus agavus* Drury, *Illustr. Exot. Ins.* iii. p. 11. t. 9. fig. 4 & Index (1782) (Rio de Janeiro); Stoll, in Cram., *Pap. Exot., Suppl.* p. 144. t. 32. fig. 1 (1790) (Rio de Janeiro).
- Princeps heroicus agavus*, Hübner, *Samml. Exot. Schmett.* i. t. 113. fig. 1. 2. ♂ (1806—).
- Meulaidés agavus*, id., *Verz. brk. Schmett.* p. 85. n. 872 (1818?) (= *lysander* Fabr.).
- Papilio agavus*, Godart, *Enc. Méth.* ix. p. 73. n. 137 (1819) (Brazil); Boisd., *Spec. Gén. Lép.* i. p. 306. n. 142 (1836) (Brazil); Drury, ed. Westw., *Illustr. Exot. Ins.* iii. p. 12. t. 9. fig. 4 (1837) (Brazil); Donbl., *List Lép. Ins. Brit. Mus.* i. p. 13 (1845) (Brazil); id., Westw. & Hew., *Gen. Diurn. Lép.* i. p. 17. n. 189 (1846); Gray, *Cat. Lép. Ins. Brit. Mus.* i. *Pop.* p. 42. n. 216 (1852); id., *List Lép. Ins. Brit. Mus.* i. *Pop.* p. 58. n. 229 (1856) (Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 5. n. 72 (1857) (Brazil); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 294. n. 68 (1864) (Brazil); Prillw., *Stett. Ent. Zeit.* xxvi. p. 130 (1865) (Coreovado); Kirby, *Cat. Diurn. Lép.* p. 536. n. 112 (1871); Bnrm., *Descr. Rép. Argent. v. Lép.* p. 66. n. 8 (1878) (Rio de Janeiro; Paraguay; Corrientes); id., *l.c.*, *Atlas* p. 9. n. 21 (1879) (Rio de Janeiro); Capronn., *Ann. Soc. Ent. Belg.* xvii. p. 9. n. 6 (1874) (Botafogo. Aug.; Rio, Oct.; Copa Cabana, Oct.; common); Obertb., *Et. d'Ent.* iv. p. 77. n. 247 (1880) (Brazil); Stand., *Exot. Tagf.* p. 14. t. 9. ♀ (1884) (Rio de Janeiro; Sao Paulo); Maase, *Untersuch. Mimicry* i. p. 77 (1893); Weym., *Stett. Ent. Zeit.* lv. p. 315. n. 8. (1895) (Rio Grande do Sul); Mabilde, *Guia Pract. Borbol. Rio Grande do Sul* p. 48 (1896); Bünningh., *Verh. Ver. Nat. Unterh.* ix. p. 28 (1896) (Rio de Janeiro); Eimer, *Orthogen.* p. 137. fig. 61 (1897); Peters, *Illustr. Zeitschr. Ent.* ii. p. 52 (1897) (Nova Friburgo, common; *partim*).
- Papilio lysander*, Butler, *Cat. Diurn. Lép. descr. Fabric.* p. 238. n. 17 (1869) (Fabr.'s "*lysander* is evidently *harrisianus*," false).
- Hectorides agavus*, Kirby, in Hübner, *Samml. Exot. Schmett.* ed. ii. p. 89. t. 113. fig. 1. 2 (1905?)

♂♀. Anal submarginal spot large on upperside, in male completely merged together with the preceding spot, the edge of the wing at anal angle being very narrowly black; in female the two spots connected, the anal spot being produced distad along M^2 , the two spots forming a Z-shaped mark, which is well separated from the anal sinus. There is often a minute dot in cell of forewing in male. The white band of the hindwing is usually composed of three spots, which vary in size, the second spot being sometimes missing, while in other individuals there are one, two or three small additional spots, situated one in front of and two behind the apex of the cell. Vein M^2 of hindwing has a more distal position than in the allied species,

Genitalia: ♂. Tenth tergite slenderer than in *P. proneus*. Harpe long, knife-like, the distal half denticulate ventrally; apex rounded dorsally, being ventrally acuminate and somewhat twisted. Penis-sheath acuminate; a flat, rounded disc of chitin projecting ventrally from the orifice of the sheath, the disc being continuous with the membranaceous ventral portion of the sheath.—♀. In front and at the sides of the vaginal orifice an irregular ridge, much folded, being semi-membranous, forming a ring which is open distally in the middle; within this ring and just behind the vaginal orifice a short process, curved anad, being convex ventrally, hollowed out on hinder (or upper) side; the membrane connecting the ridge with the seventh sternite densely folded, there being a more strongly chitinised, smooth, rounded lobe laterally where this membrane joins the seventh sternal sclerite; in a non-virgin female the central process is enveloped by a hardened substance blocking up the vaginal orifice. Anal segment with numerous short stout bristles.

Early stages described by Burmeister, *l.c.*

Hab. Brazil: Minas Geraës to Rio Grande do Sul; Paraguay; Argentina: Corrientes.

In the Tring Museum 34 ♂♂, 16 ♀♀, from: Minas Geraës, March and April (A. Kennedy); Tijuca and Petropolis, March; Castro, Parana, March and October (E. D. Jones); Sapucay, Paraguay, January, August, October, December (W. Foster); Yhu, Paraguay, September to December (Ae deer).

4. *Papilio proneus* Hübn. (1825).

Hectorides proneus Hübner, *Samml. Exot. Schmettl., Zuträge* p. 25, n. 249, fig. 497-8 (1825) (Brazil).

Papilio proneus, Boisduval, *Spec. Gén. Léop.* i. p. 307, n. 143 (1836) (Brazil); Doubl., Westw. and Hew., *Gen. Diurn. Lep.* i. p. 17, n. 188 (1846); Doubl., *List Lep. Ins. Brit. Mus. i. Append.* p. 3. (1848) (Rio de Janeiro); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 42, n. 214 (1852); id., *List Lep. Ins. Brit. Mus. i. Pap.* p. 58, n. 226 (1856) (Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép. i. Suppl.* p. 68, n. 1125 (1857) (Brazil); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 294, n. 70 (1864) (S. Brazil); Kirby, *Cat. Diurn. Lep.* p. 536, n. 114 (1871); Burm., *Descr. Léop. Argent. v. Léop. Atlas* p. 9, n. 22 (1879) (Petropolis; Nova Friburgo); Oberth., *Et. d'Ent.* iv. p. 77, n. 246 (1880) (Brazil); Staud., *Exot. Tagf.* p. 14 (1884) (Rio de Janeiro; Sao Paulo); Bönningh., *Verh. Ver. Nat. Unterh.*, Hamburg ix. p. 28 (1896) (Organ Mts.).

Papilio phryneus Lucas, *Rev. Zool.* (2) iv. p. 136 (1852) ("Cayenne" loci error); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 42, n. 215 (1852) (Brazil; "Cayenne"); Kirby, *Cat. Diurn. Lep.* p. 536, n. 113 (1871) ("Cayenne" loci error).

♂♀. Red submarginal spots of hindwing transverse, oblong or linniform, not sandglass-shaped as in *P. chamissonia*; anal spot not V-shaped, there being no discal spot proximally of the anal submarginal one. Width of central band and the number of spots composing it on hindwing variable. Foretibia and first foretarsal segment more finely hairy, less spinose, than in *P. agaveus*.

Genitalia different from those of the allied species, the female bearing after copulation a kind of pouch, externally visible and homologous to the pouch of *Euryades*, *Parnassias*, and *Acraca*.—♂. Tenth segment as in the allied species, the tergite being very long and slender. No separate harpe on clasper, the harpe being represented by a polished central space which extends from base to middle, being rounded distally; this space depressed, a triangular distal portion of it being slightly elevate; ventral edge of clasper with a short stout conical tooth. Penis-sheath strongly chitinised at apex, ending in a sharp point.—♀. In a virgin specimen there is at each side of the vagina a large flap, rounded, asymmetrical, bearing distally several carinae, the two flaps inclining towards each other; from

the slit between them, which widens distally, there projects a curved process pointing anad; these organs are distinct without dissection, projecting free, not being covered by the scaling. On dissection the central process is found to be situated immediately behind the vaginal orifice, being convex ventrally, and channelled on the posterior or dorsal side; the apex of this process is slightly incrassate, giving the process a feebly ladle-shaped outline in lateral aspect. The lateral flaps are continuous proximally of the vaginal orifice, being the lateral portions of a ridge which is almost entirely separated into two halves by a deep mesial sinus. In a female which has copulated the central process is enveloped by a hardened substance which forms a large irregular cone effectually blocking up the vaginal orifice, the lateral flaps remaining free, at least distally, the hardened substance covering the flaps only proximally.

Early stages not known.

Hab. Brazil: Minas Geraës to Parana, perhaps farther south.

In the Tring Museum 42 ♂♂, 14 ♀♀, from: Minas Geraës, April (A. Kennedy); Petropolis, October—February (A. Foetterle); Bahuru, Sao Paulo (Dr. Hempel); Castro, Parana, November (E. D. Jones).

5. *Papilio chamissonia* Eschsch. (1821).

Papilio chamissonia Eschscholtz, in Kotzebue, *Reise* iii. p. 203. n. 3. t. 2. fig. 3. ♂ (1821) (Brazil).

Menelaides lunichus Hübner, *Samml. Exot. Schneit.* ii. t. 103 (1822?)

Papilio ascalus Godart, *Enc. Méth.* ix. *Suppl.* p. 812. n. 137-8 (1824) (Brazil).

♂♀. Upperside of wings with a slight metallic green tint; white spot in cell of hindwing not extending farther basad than point of origin of M^2 , white spot M^1 — M^2 reaching at least as far distad as spot R^3 — M^1 ; red submarginal spots constricted, sandglass-shaped; a red (discal) bar proximally of anal bar, connected with the latter to form a V-shaped spot; harpe of ♂ a little narrower, and central process of ♀ a little longer.

Genitalia as in *P. perrhebus*.

For early stages described by E. D. Jones, see below.

Hab. Brazil.

Two subspecies.

a. *P. chamissonia didorus* Hopff. (1866).

Papilio didorus Hopffer, *Stett. Ent. Zeit.* xxvii. p. 23. n. 2 (1866) (Brazil); Kirby, *Cat. Diurn. Lep.* p. 567. n. 333 (1871).

Papilio echedorus, Oberthür (non Boisduval, 1836, err. det.), *Et d'Ent.* iv. p. 77 n. 244 (1880).

Papilio campeiro Foetterle, *Rev. Mus. Paulista* v. p. 622. t. 15. fig. 2. ♀ (1902) (Minas Geraës).

♂♀. Fringe of both wings entirely white. Band variable in width, straight on hindwing, *didorus* being based on narrow-banded individuals, and *campeiro* on narrow- and broad-banded ones, the difference not being geographical.

There are two Boisduvalian specimens in coll. Oberthür which belong to this form. In 1880 Oberthür considered them to be typical specimens of *echedorus*. However, according to the description and the locality—Sta. Catharina—Boisduval's *echedorus* is the next form. Probably Boisduval replaced his original specimens later by some better preserved ones which happened to belong to another geographical race.

Hab. Minas Geraës, interior of Sao Paulo; Goyaz; San Antonio de Barra, Bahia.

In the Tring Museum 4 ♂♂ from Minas Geraës, February (A. Kennedy).

b. P. chamissonia chamissonia Eschsch. (1821).

Papilio chamissonia Eschscholtz, *l.c.*; Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 41, n. 212 (1852) (Brazil); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 57, n. 224 (1856) (Brazil); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 294, n. 72 (1864) (= *echedorus* = *curydorus*); Kirby, *Cat. Diurn. Lep.*, p. 536, n. 115 (1871); Oberth., *Et. d'Ent.* iv. p. 77, n. 243 (1880) (Brazil); Staud., *Exot. Tagf.* p. 14 (1884) (S. Catharina).

Menelaides bunichus Hübner, *l.c.*

Papilio ascalus Godart, *l.c.*

Papilio echedorus Boisduval, *Spec. Gén. Léop.* i. p. 308, n. 144 (1836) (S. Catharina); Doubl., Westw. and Hew., *Gen. Diurn. Lep.* i. p. 17, n. 187 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 42, n. 213 (1852) (Brazil); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 57, n. 225 (1856) (Brazil?); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 4, n. 71 (1857) (haec subsp.?).

Papilio bunichus, Boisduval, *l.c.* n. 145 (1836) (Brazil); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 13 (1845) (Brazil); id., Westw. and Hew., *Gen. Diurn. Lep.* i. p. 17, n. 186 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 41, n. 211 (1852) (Brazil); id. *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 57, n. 223 (1856) (= *ascalus*; Brazil); Ménétr., *l.c.* n. 70 (1857); Felder, *l.c.* n. 71 (1864) (Brazil); Kirby, *l.c.* n. 116 (1871); Burm., *Descr. Rép. Argent.* v. *Atlas* p. 9, sub n. 21 (1879) (S. Catharina; Pt. Alegre; "not at Rio de Janeiro"); Oberth., *l.c.* n. 245 (1880) (Brazil); Jones, *Proc. Lit. Philos. Soc. Liverpool* p. 15 (1883) (metamorphosis); Staud., *Exot. Tagf.* p. 14 (1884) (Rio de Janeiro; Sao Paulo); Haase, *Untersuch. Mimicry* i. p. 77, t. 10, fig. 69. ♀ (1893); Mabilde, *Guia Pract. Borbol. Rio Grande do Sul* p. 48 (1896).

Papilio curydorus Lucas, *Rev. Zool.* (2). iv. p. 135 (1852) (S. Catharina); Doubl., Westw. and Hew., *Gen. Diurn. Lep.* ii. p. 529 (1852); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 42, n. 216 (1852) (Brazil); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 58, n. 228 (1856) (Brazil); Lucas, in Casteln., *Voy. Amér. Sud* iii. *Lép.* p. 198, t. 2, fig. 1. ♂ (1857).

Hectorides bunichus, Kirby, in Hübn., *Samml. Exot. Schmett.* ed. ii. p. 89, t. 316, fig. 3. 4 (190—?).

♂♀. Fringe of forewing less extended white than in the preceding form, sometimes all black; fringe of hindwing black at the apex of the teeth. White band variable in width, on forewing often very thin and anteriorly obsolete; on hindwing on the whole narrower and posteriorly less widened in specimens from Santa Catharina (*chamissonia* = *echedorus* = *curydorus*) than in the individuals from Sao Paulo and Rio de Janeiro (*bunichus*); however, the difference does not hold good.

Hab. Petropolis; Sao Paulo; Parana; Santa Catharina.

In the Tring Museum 24 ♂♂, 18 ♀♀, from: Petropolis (Foetterle); Sao Paulo, August to January (E. D. Jones); Jndiah; Theresopolis, S. Catharina (J. Michaelis); Castro, Parana, October and November (E. D. Jones).

6. *Papilio perrhebus* Bois. (1836).

Papilio perrhebus Boisduval, *Spec. Gén. Léop.* i. p. 305, n. 140 (1836) (Paraguay; Rio Grande).

Papilio perrhaebus (1), Burmeister, *Descr. Rép. Argent.* v. *Lép.* p. 65, n. 7 (1878); id., *l.c. Atlas* p. 8, t. 2, fig. 8, t. 3, fig. 10 (1889) (larva; ♂).

♂♀. No discal band on wings. Submarginal spots of hindwing transverse, constricted or interrupted in middle; a spot proximally of anal one representing the discal row, this spot distinct only below, often joined to the anal submarginal bar, the two spots forming a kind of V; some specimens have a small white discal spot M¹—M². Cell of hindwing broader distally than in the allied species, and the subbasal cellule longer.

Genitalia: ♂. Tenth tergite slender, tapering, much longer than the sternite. Harpe reaching close to apex of elasper, sublinear, slightly tapering at apex, rounded at base ventrally, dorsally subangulate a short distance from apex, the whole ventral edge and the dorsal edge from apex to the before-mentioned angle denticulate.—♀. Behind vaginal orifice a curved, ladle-shaped process, convex

ventrally, excavate on upper or distal side; curved anal; proximally of orifice a low folded ridge extending on each side beyond the central process, forming a ring which opens behind; this ridge widest behind; at each side of the ridge the membrane densely plicate and further lateral again raised into a smooth, somewhat rounded ridge.

Early stages described by Burmeister, *l.c.*

Hab. Sao Paulo to Buenos Aires and northwards to Paraguay.

Two subspecies.

a. P. perrhebus perrhebus Bois. (1836).

Papilio perrhebus Boisduval, *l.c.*; Doubl., Westw. and Hew., *Gen. Diurn. Lep.* i. p. 19. n. 226 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 41. n. 206 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 56. n. 217 (1856) (Paraguay); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 294. n. 74 (1864) (Paraguay; Rio Grande); Kirby, *Cat. Diurn. Lep.* p. 536. n. 119 (1871) (Paraguay); Oberth., *Et. d'Ent.* iv. p. 97. n. 248 (1880) (Paraguay); Gosse, *Eutom.* xiii. p. 194 (1880) (Assuncion, not scarce, Nov. Dec.); Staud., *Exot. Tagf.* p. 15 (1884) (Paraguay; Rio Grande do Sul teste Bois.); Haase, *Untersuch. Mimicry* i. p. 77 (1893); Weym., *Stett. Ent. Zeit.* iv. p. 315. n. 7 (1895) (Rio Grande do Sul).

Papilio perrhebus var., Mabilde, *Guin Pract. Borbol. Rio Grande do Sul* p. 48 (1896).

♂ ♀. Frons and palpus red. Submarginal spots of hindwing bright red on both sides. Fringe of hindwing black at the ends of the veins.

Hab. Brazil: Sao Paulo to Rio Grande do Sul; Paraguay and neighbouring districts of Argentina.

In the Tring Museum 12 ♂♂, 6 ♀♀, from: Sao Paulo; Rio Grande do Sul; Sapucay, Paraguay, August to October (W. Foster).

b. P. perrhebus damocrates Guen. (1872).

Papilio damocrates Guené, *Mém. Soc. Phys. Hist. Nat. Genève* xxii. p. 371. n. 4. fig. 2. ♂ (1872) (Buenos Aires); Staud., *Exot. Tagf.* p. 15 (1884) (Argentina).

Papilio perrhebus, Guené, *Pct. Nouv. Ent.* p. 201 (1872) (= *damocrates*); Kirby, *ibid.* p. 239 (1872) (= *damocrates*); Guen., *l.c.* p. 244 (1872); Kirby, *Cat. Diurn. Lep.* p. 810. n. 119 (1877) (*partim*; *damocrates* = *perrhebus*); Staud., *l.c.* t. 9. ♂ (1884) (the figure too black).

Papilio perrhebus, Burmeister, *l.c.* (Buenos Aires; 1. on *Aristolochia ciliata*).

Papilio perrhebus var. *damocrates*, Obertür, *Et. d'Ent.* iv. p. 77 and 115. sub n. 248 (1880) (Buenos Aires).

♂ ♀. Paler than the preceding, especially the female; red colour on body more restricted, palpi and frons usually quite black. White border of forewing wider and that of hindwing not interrupted; submarginal spots less distinct, paler on both sides.

Hab. Buenos Aires and Entre Rios, probably also in Uruguay.

In the Tring Museum 31 ♂♂, 24 ♀♀, and a series of larvae and pupae, from: Buenos Aires, December to February (Ruscheweyh); Paysandu; La Soledad, Entre Rios, end of November to January (Chas. Britton and Miss E. A. Britton).

7. *Papilio phalaecus* Hew. (1861).

Papilio phalaecus Hewitson, *Trans. Ent. Soc. Lond.* p. 32 (1869) (Ecuador); id., *Exot. Butt.* iv. t. 11. fig. 37 (1869); Kirby, *Cat. Diurn. Lep.* p. 536. n. 118 (1871); Staud., *Exot. Tagf.* p. 14 (1884); Dognin, *Faune Léop. Laja* i. p. 11 (1887); Maass. & Weym., in Stabel, *Reisen S. Amer., Lep.* p. 64. n. 87 (1890) (Huamboya); Dognin, *l.c.* ii. p. 37 (1891); Haase, *Untersuch. Mimicry* p. 77 (1893).

Papilio phalaecus (?), Hewitson, *Exot. Butt.* iv. *Index* (1872).

♂ ♀. Body woolly; head, prothorax and palpus black, a few red scales behind eye. Mid- and hindtibiae minutely hairy, and armed with dispersed spines, as in

P. agarus. A white band from costal margin of forewing to anal angle of hindwing, parallel to distal margin of forewing, shaded with black scaling on forewing and distally on hindwing, interrupted by the black veins; the band close to cell on both wings, wider in ♀ than in ♂; ♀ with white spot in cell of forewing; a row of red submarginal spots on hindwing, densely shaded with black on upperside, especially in ♂.

Scent-organ: fold rather narrower than in the allied species.

Genitalia: ♂. Clasper rounded at apex or slightly emarginate; harpe longitudinal, much shorter than the clasper, the apico-ventral marginal area of the latter being broad, apex of harpe feebly acuminate, a little curved upwards, ventral and apical edges dentate, at base of harpe two heavy conical teeth, both vertical on the plane of the harpe, one standing at the ventral edge, the other farther dorsad.—♀ not dissected.

Early stages not known.

Hab. Eastern Ecuador.

This is the only American species of *Aristolochia*-feeders bearing a spatulate tail which occurs in a central district of the Neotropic region, all the other tailed *Aristolochia*-Swallowtails being found either in Brazil and the Rio La Plata (R. Paragnay and R. Parana) districts, or in Central America from Costa Rica northwards, and the West Indian Islands Cuba and Haiti.

In the Tring Museum, 2 ♂♂ from: Loja, July 1886; Zamora (O. T. Baron).

8. *Papilio photinus* (Doubt.) (1844).

Papilio photinus Doubleday, *Ann. Mag. N. H.* xiv. p. 415 (1844) (W. Mexico?); id., *List Lep. Ins. Brit. Mus.* i. p. 12 (1845) (W. Mexico?); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 229 (1847) (Mexico); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 65. n. 287. t. 11. fig. 2. ♀ (1852) (West coast of America); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 75. n. 304 (1856) (West coast of Am.; Mexico); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863) (Mexico); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 294. n. 77 (1864) (Mexico); Kirby, *Cat. Diurn. Lep.* p. 536. n. 122 (1871) (Mexico); Guen., *Mém. Soc. Phys. Hist. Nat. Genève* p. 379 (1872) (Mexico, ♂ ♀); Kirby, *Pet. Nouv. Ent.* p. 239 (1872); Butl. & Druce, *Proc. Zool. Soc. Lond.* p. 363. n. 364 (1874) (Costa Rica); Oberth., *Et. d'Ent.* iv. p. 80. n. 262 (1880) (Mexico); Staud., *Exot. Tagf.* p. 15 (1884) (Mexico); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 196. n. 9. t. 65. fig. 7, 7A, fold, genit. (1890) (Mexico to Costa Rica); Haase, *Untersuch. Mimicry* p. 77. t. 9. fig. 62. ♀ (1893); Godm. & Salv., *l.c.* p. 728 (1901) (Guadalajara).

♂ ♀. Upperside metallic, especially the hindwing, which has a strong blue gloss in male, being less strongly glossy in female; scales of upperside feebly dentate, the upper scales partly entire in male, the same being the case in the posterior area of the underside of the forewing; no markings on forewing, except the distinct white fringe-spots; but one of our females has a row of indistinct pinkish grey patches about 5 mm. distant from distal margin, the row curving costal in front, the first spot standing behind R¹ and the last before SM², this last spot being present in several other specimens; this row of patches corresponds to the blue band of *P. columbus* (= *gundlachianus*); posterior fringe-spots sometimes pink.—Hindwing: two parallel rows of red spots, submarginal spots strongly arched except upper two or three and anal one; the latter distinct on upperside only in female.

Genitalia: ♂. Tenth tergite only a little longer than the sternite; clasper somewhat variable in outline, short, broad, obliquely emarginate-truncate, both angles strongly rounded, dorsal edge somewhat incurved; harpe much shorter than the clasper, divided into two lobes, both rounded at apex, one apical, the other basal and ventral, the latter smaller than the former, which is somewhat

curved ventrad; penis-sheath pointed, but the apex a little twisted and curved over the orifice, less strongly chitinised than in *P. montezuma*, *agavus*, etc.—
♀. Antevaginal ridge small, low; postvaginal process short, broad, continued laterad as a low carina; anal segment with short stout blunt bristles ventrally.

Early stages not known.

Hab. East and West Mexico, southwards to Costa Rica.

In the Tring Museum, 54 ♂♂, 16 ♀♀, from: Jalapa and Espinal, Vera Cruz (W. Schaus); Patzcuaro, Michoacan; Cuernavaca, July, 4000 ft. (A. Hall); Cuantla, Morelos, June, 3800 ft. (A. Hall); Colima; Guerrero (O. T. Baron); Amatitlan, W. Guatemala, August, 4000 ft. (A. Hall); La Antigua, W. Guatemala, August, 5200 ft. (A. Hall); Pozo Azul, June, and Volcan de Miravalles, Costa Rica, (Underwood).

9. *Papilio alopis* Godm. & Salv. (1890).

Papilio alopis Gray, *List Lep. Ins. Brit. Mus. i. Pap.* p. 58. n. 231 (1856) (Mexico; *nom. nud.*); Godm. and Salv., *Biol. Centr. Amer., Rhop.* ii. p. 197. n. 12. t. 65. fig. 10. 11. ♀ (1890) (Chihuahua and Durango, Mexico; ♀♀ only); Haase, *Untersuch. Mimicry* p. 78 (1893); Godm. and Salv., *l.c.* p. 728 (1901) (Nicaragua).

♂♀. Larger than *P. photinus*, less glossy; spots of hindwing much smaller, partly white, those of proximal row very small, white or pinkish white, the upper ones obliterated, sometimes the whole row missing, tail spatulate.

Genitalia: ♂. Clasper rounded at apex; ventral lobe of harpe narrow, pointed.—♀ not dissected.

Hab. West Mexico; Nicaragua.

In the Tring Museum, 10 ♂♂, 2 ♀♀, from: Guadalajara, August and October (W. Schaus); Guerrero (O. T. Baron).

10. *Papilio dares* Hew. (1867).

Papilio dares Hewitson, *Trans. Ent. Soc. Lond.* (3). v. p. 561. n. 2 (1867) (♀, Nicaragua); *id.*, *Exot. Butt.* iv. *Pap.* t. 11. fig. 34. ♀ (1869); Kirby, *Cat. Diurn. Lep.* p. 536. n. 123 (1871) (Nicaragua); Haase, *Untersuch. Mimicry* p. 77 (1893); Godm. and Salv., *Biol. Centr. Amer., Rhop.* ii. p. 196. n. 10 (1890) (Nicaragua).

♀. Only one specimen known. Resembling *photinus*; forewing with a white dot R¹—R³; upper two submarginal spots of hindwing not curved, the following three very slightly luniform, anal spot large. Femora scaled.

Hab. Nicaragua.

11. *Papilio montezuma* Westw. (1842).

Papilio montezuma Westwood, *Arc. Ent.* i. p. 67. t. 18. fig. 3. ♂ (1842) (Mexico); Duubl., *List Lep. Ins. Brit. Mus.* i. p. 12 (1845) (W. Mexico); *id.*, Westw. and Hew., *Gen. Diurn. Lep.* i. p. 19. n. 227 (1847); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 65. n. 286 (1852) (West Coast of America); *id.*, *List Lep. Ins. Brit. Mus. i. Pap.* p. 75. n. 303 (1856) (Yucatan; Nicaragua; West Coast of Amer.); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147. (1861) (Mexico; Centr. Amer.); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 294. n. 76 (1864) (Mexico; Chiapas; = *ulawi*); Kirby, *Cat. Diurn. Lep.* p. 536. n. 121 (1871) (Mexico); Oberth., *Et. d'Ent.* iv. p. 77. n. 250 (1880) (Mexico; Yucatan); Godm. and Salv., *Biol. Centr. Amer., Rhop.* ii. p. 197. n. 11. t. 65. fig. 8. 8A. fold, genit. (1890) (Mexico to Nicaragua); Haase, *Untersuch. Mimicry* p. 78 (1893); Hoag, *Ent. News* xiv. p. 320 (1903) (Altamira, Mex.).

Papilio perhelus, Ménétries (*non* Boisduval, 1836, *err. det.*), *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 5. n. 89 (1857) (Nicaragua).

Papilio talma Reakirt, *Proc. Ent. Soc. Philad.* ii. p. 140. n. 12 (1863) (Chiapas); Strecker, *Lep. Rhop. Hct., Suppl.* iii. p. 17 (1900) (♂, type; = *montezuma*).

♂♀. No markings on forewing, except the white fringe-spots, which are often indistinct. On hindwing a row of red submarginal spots, which are larger

in the female than in the male; on upperside the first three spots often absent or vestigial; the spots larger in southern specimens than in most individuals from the more northern districts of the range, the tail being somewhat reduced in the former. Legs characteristic. Femora naked, rough with dispersed conspicuous granules, mostly bearing a bristle or thin hair. The bristles of the tibiae and tarsi also situated on granules, which are smaller than on the femora. Spur of foretibia proximally of middle.

Genitalia: ♂. Clasper rounded at apex; harpe gradually tapering, ending in a sharp point, almost reaching apical edge of clasper, the free apical half longitudinally impressed. Penis-sheath essentially as in *agavus*, *columbus*, etc. Tenth tergite about one-third longer than the lobes of the sternites, slender, pointed, basally subcarinate above.—♀. Behind the vaginal orifice a short, broad process about half as long again as it is broad in middle, slightly sinuate at apex, convex on proximal, concave on distal side; a large lobe proximally of orifice, emarginate in middle, rounded, finely hairy, its distal surface concave; in non-virgin females these organs concealed under a hardened coital substance.

Early stages not known.

Hab. Mexico to Nicaragua.

In the Tring Museum, 100 ♂♂, 48 ♀♀, from: Colima; Guadalajara, October (W. Schaus); Patzenaro; Cuernavaca, end of August, September (Dr. Gadow); Guerrero (O. T. Baron); S. José, Guatemala, September (A. Hall); S. Pedro Sula, Honduras.

II. Aeneas Group.

Marginal spots of hindwing white (in *hlaresi* vestigial). Palpus black or red. Tibiae of ♂ incrassate and hairy, or non-incrassate and spinose as in ♀. Scent-organ woolly, or the scales at least elongate, the wool being white, brown-black or tawny.

This is the largest group of Aristolochia-Swallowtails. Though some of the species differ much from one another, the group does not appear to fall into sharply defined divisions. We have not seen *P. hahneli*, but the figures published by Standinger show it to be a near relative of *P. triopas*, which itself is very close to *chabrias*. The great gap between *hahneli* and *aeneas* is overbridged by a series of more or less close allies: *triopas*, *chabrias*, *quadratus*, *pizarro*, *coelus*, and *steinbachi*.

The species of this group are partly very difficult to distinguish, there being often very little in the outward appearance by which one can differentiate them. However, if some attention is paid to the structure of the tibiae of the males, the colour of the palpi of both sexes, the extent of red at the apex of the abdomen of the females, and the shape of the apex of the cell of the hindwing, the reader will generally be able to identify the species and mate the sexes correctly.

Key to the species:—

A. Palpus black (in *drucei* sometimes red).

a. Hindwing with yellowish white area which occupies at least half the cell b.

Hindwing with yellowish white area which stands outside the cell or occupies only the apex of the same; no white patch on forewing c.

- Hindwing with red patch or band on upperside, or with white patch in cell of forewing *d.*
- b.* Forewing with large basal patch of the same colour as the median and subapical bands Species No. 12.
Forewing without basal patch Species No. 13.
- c.* Hindwing below with red anal spot Species No. 16.
No red anal spot on underside of hindwing; forewing with a row of postdiscal spots, sometimes absent in ♀, yellowish patch of hindwing entering cell Species No. 14.
No red anal spot on hindwing; forewing without postdiscal spots; cell of hindwing entirely black, or only a minute creamy spot at apex Species No. 17.
- d.* Hindwing below with a red anal spot which is much more distal than the discal spot which stands in front of it *e.*
Last spot of underside of hindwing on a level (or nearly) with the next spot, or forewing with green patch. *f.*
- e.* Forewing with diffuse white patch at apex of cell Species No. 15.
Forewing with sharply defined white patch posteriorly on disc Species No. 18.
- f.* Tooth R^3 of hindwing prolonged to a tail Species No. 21.
Tooth R^3 of hindwing not or very little more prominent than the other teeth *g.*
- g.* Fringe-spots of hindwing absent or vestigial; abdomen without red spots (♀; ♂ not known) Species No. 19.
Fringe-spots of hindwing distinct *h.*
- h.* Males *i.*
Females *m.*
- i.* Red area of upperside of hindwing large, occupying at least the apical fourth of the cell; no green patch on forewing Species No. 22.
The red area occupying more than half the cell; a green patch on forewing Species No. 20.
A row of rounded or ovate spots on hindwing; forewing without green patch Species No. 26.
Cell of hindwing black, a green patch on forewing *j.*
- j.* Abdominal fold black at base; green patch of forewing very large, glossy; hindwing black above, with or without a red spot near anal angle *k.*
Abdominal fold not black at base; hindwing with a band of red patches; red spots of hindwing strongly opalescent *l.*
- k.* Green area of forewing entering cell Species No. 24.
Green area of forewing not entering cell Species No. 23.
- l.* Green patch of forewing reaching forward to R^3 , or narrow, being at least twice as long as broad; longest red spot of hindwing three or four times as long as broad, usually a red streak behind M^2 Species No. 27.
Green patch more or less triangular, about as broad posteriorly as long, often broader; longest red spot of hindwing about twice as long as broad Species No. 25.

- m.* Forewing without white patch, or the edges of the patch washed out and the fringe-spots of the forewing indistinct or absent *n.*
 Forewing with sharply defined patches and distinct fringe-spots *q.*
- n.* Hindwing with a row of widely separated ovate spots which stand nearer the margin than cell Species No. 26.
 Red spots of hindwing merged together, or at least some separated only by the black veins *o.*
- o.* Apex of cell of hindwing acute, vein D³ being oblique and longer than D⁴ Species No. 22.
 Apex of cell of hindwing truncate, vein D³ being transverse and shorter than D¹ *p.*
- p.* Fringe-spots of forewing distinct, no white on disc and in cell Species No. 27.
 Fringe-spots absent, indistinct, or distinct but small, in the last case always a white patch in middle of wing Species No. 20.
- q.* White spot M¹—M² of forewing smaller than spot R³—M¹, often absent; cell-spot large Species No. 25.
 White spot M¹—M² of forewing larger than spot R³—M¹, the latter often absent; cell-spot small or absent, usually a spot behind M² *r.*
- r.* A row of small white spots outside apex of cell Species No. 24.
 No such spots Species No. 23.
- B. Palps red (often black in *P. drucei*).**
- a.* Males *b.*
 Females (*the key should be consulted in connection with the descriptions*) *i.*
- b.* Forewing without any trace of a green patch; hindwing with more than three red spots on upperside Species No. 33.
 Forewing with green patch, or trace of it, rarely absent; in the latter case there is always a white dot on forewing *c.*
- c.* Tibiæ and first tarsal segment somewhat incrassate, hairy *d.*
 Tibiæ and first tarsal segment not incrassate, spinose as in ♀ *e.*
- d.* Tooth R³ of hindwing much more prominent than the others; forewing with large white patch; hindwing with three rather small red spots, there being often a minute fourth spot standing near the apical angle Species No. 37.
 Tooth R³ of hindwing not or only a little more prominent than the other teeth; the red spot behind M² on upper-side of hindwing large, the red band triangular, consisting of three spots which stand close together; no white spots on forewing, or only a minute one; green patch not extending forward beyond M¹ Species No. 30.
 Tooth R³ of hindwing not or slightly more prominent than the others; green patch of forewing narrow, or reaching forward beyond M¹, or forewing with a large white spot M¹—M² or several spots, or red patch of hindwing small,

- consisting of three spots and occasionally a small fourth one which stands behind M^2 Species Nos. 34 and 35.
- c.* Red patch on upperside of hindwing small, elliptical, consisting of two contiguous spots ; spots on underside of hindwing glaucous cream-colour Species No. 28.
Hindwing with at least three red spots on upperside *f.*
- f.* Patch of hindwing triangular, spot M^2 —(SM^1) large Species No. 33.
Spot M^2 —(SM^1) of hindwing absent or small *g.*
- g.* Hindwing with a red spot behind M^2 Species No. 31.
Hindwing without a red spot behind M^2 , or this spot minute *h.*
- h.* Spots on underside of hindwing almost uniformly red in colour Species No. 29.
Spots on underside of hindwing partly pale pink ; forewing often with prominent white spot before M^1 or before R^3 , sometimes without green patch Species No. 32.
- i.* Forewing without white patch *j.*
Forewing with white patch *l.*
Forewing with broad white band ; underside of hindwing for the greater part white and pink Species No. 36.
- j.* Band of hindwing creamy white Species No. 28.
Band of hindwing red *k.*
- k.* Hindwing with a band of six red spots which stand nearer the distal margin than the cell ; apex of forewing very little paler than base Species No. 33.
Forewing semi-transparent in apical half ; hindwing feebly dentate Species No. 27.
Forewing semi-transparent in apical half ; hindwing strongly dentate Species No. 35.
- l.* Forewing with greyish green patch before hindmargin Species No. 29.
Forewing without greyish green patch *m.*
- m.* White spot R^2 — R^3 of forewing larger than patch R^3 — M^1 Species No. 32 and 34.
White spot R^2 — R^3 smaller than R^3 — M^1 , often absent *n.*
- n.* Hindwing with tooth R^3 prominent, red spot C — SC^2 usually present, while spot SC^2 — R^1 is absent Species No. 37.
Tooth R^3 of hindwing not much more prominent than the other teeth ; if spot C — SC^2 is present, spot SC^2 — R^1 is also marked *o.*
- o.* Spot M^1 — M^2 of forewing present, usually large *p.*
Spot M^1 — M^2 of forewing absent *r.*
- p.* Cell-patch of forewing very large, occupying at least one-third of the cell Subspec.No. 30*b.*
Cell-patch smaller *q.*
- q.* Red band of hindwing narrow and short, not extending forward beyond R^2 , consisting of four or five spots only which are more or less completely merged together Subspec. No. 31*c.*
Red band of hindwing consisting of at least six spots Species No. 35

- r. Cell-spot of forewing absent or small Species No. 30.
 Cell-spot of forewing large, extending across the cell (or nearly) s.
- s. Cell-spot of forewing transverse, narrow, about twice as long as broad Subspec. No. 34a.
 Cell-spot of forewing broad, nearly square, sometimes triangular t.
- t. Forewing semi-transparent in apical half Species Nos. 32 and 35.
 Forewing not semi-transparent in apical half Species No. 31.

12. *Papilio hahneli* Staud. (1882).

♂ ♀. *Papilio hahneli* Staudinger, *Proc. Zool. Soc. Lond.* p. 396. t. 24. fig. 1. ♂ (1882) (Massaury); id., *Exot. Taf.* p. 19. t. 13. ♀ (1884); Hahnel, *Iris* iii. p. 257 (1890) (Massaury, below Maués); Haase, *Untersuch. Mimicry* i. p. 79 (1893).

♂ ♀. Sexes similar; three broad bands of yellowish grey patches on forewing, one subbasal, the second central, and the third subapical. Hindwing tailed; yellowish area occupying the greater part of the wing; anal angle strongly produced in male.

Hab. Maués, Amazons.

In coll. Staudinger.

13. *Papilio triopas* Godt. (1819).

Papilio triopas Godart, *Enc. Méth.* ix. p. 33. n. 23 (1819) (♀, hab. ?); Grimsh., *Trans. Roy. Soc. Edinb.* xxxix. 1. No. 1. p. 7 (1897) (type in Mus. Edinburgh).

♂ ♀. Palpus black. End-segment of antenna hardly as long as broad. Forewing elongate, lower angle of cell very obtuse. Hindwing reduced in size, tooth R³ prominent, cell acuminate, veins R² and R³ standing close together, D³ being very short. Pattern similar in the sexes, but the yellowish markings larger in female than in male; the subapical and central patches of the forewing reminding one of the spots of *Papilio childrenae* and the blue band of *P. columbus*. Tibiae of mid- and hindlegs of male somewhat incrassate, hairy, and anal angle of hindwing strongly produced. Abdomen of female with a red spot in front of vaginal cavity and another behind it.

Scent-organ: fold large; a line of broad buff scales on SM², at the abdominal side of which there is a broad clayish streak consisting of very small scales. These scales very densely packed together, erect, elongate-triangular, widest at apex, which is somewhat rounded, being centrally produced into a thin thread; the base of each scale also threadlike. This scent-organ, as regards the shape of the scales, represents doubtless a less advanced type than the woolly scent-organ of other species.

Genitalia: ♂. Ninth tergite bearing at each side of base of teeth a conical, spinelike tooth. Harpe narrow, curved, distally dilated, the apical portion triangular, short, ventral edge denticulate.—♀. Anal segment ventrally with numerous thin gradually tapering bristles; edge of vaginal aperture raised, the proximal wall of this short funnel tawny, smooth; behind the aperture and covering the vaginal cavity a rounded plate which is concave on its distal surface; the edge of this plate dilated to a short rounded process which curves distad.

Early stages not known.

Hab. The Guianas and Lower Amazons.

Two subspecies.

a. P. triopas triopas Godt. (1819).

- Papilio triopas* Godart, *Lc.*; Boisd., *Spec. Gén. Léq.* i. p. 313. n. 151 (1836) (Cayenne); Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vii. p. 48 (1838); Doubl., Westw. and Hew., *Gen. Diurn. Lep.* ii. p. 529 (1852); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 69. n. 314 (1852) (*partim*; Amazons); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Para, and all over the Amazons); Lucas, in Chenu, *Enc. Hist. Nat., Pap.* i. p. 38. t. 4. fig. 1. ♂ (1851-53) (Cayenne); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 80. n. 331 (1856) (*partim*; Para; Amazons); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 343, 358 (1861) (Guiana; Lower Amazons); id., *Journ. Entom.* i. p. 226. n. 16 (1862) (Lower Amazons and Pará, forest); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 292. n. 36 (1864); Kirby, *Cat. Diurn. Lep.* p. 528. n. 66 (1871) (Guiana; Lower Amazons); Müsehl., *Verh. Zool. Bot. Ges. Wien* xxvii. p. 295 (1876) (Surinam); Oberth., *Et. d'Ent.* iv. p. 97. n. 295 (1880) (Guyane; Pará); Staud., *Exot. Tagf.* p. 14. t. 9. ♂ (1884) (Guiana; Lower Amazons); Haase, *Untersuch. Mimicry* i. p. 79 (1893).
- Ascunides triopas*, Hübner, *Sannul. Exot. Schmett., Beiträge* v. p. 32. n. 465. fig. 929. 930. ♀ (1837); Kirby, in Allen's *Nat. Libr., Lep. Butt.* ii. p. 269 (1896) (Guiana; Lower Amazons).
- Papilio triopas* (1), Ménétries, *Enum. Corp. Anim. Mus. Petrop., Léq.* ii. p. 69. n. 1134 (1857) (Cayenne).

♂ ♀. The markings of fore- and hindwing variable in size and number. Forewing of male usually with one large and two small subapical spots, the small ones being often vestigial on upperside, the one in subcostal fork more often quite obliterated; male mostly without cell-spot, while all the females have an elongate cell-spot.

Hab. French and Dutch Guiana; Amazons, from Pará to Obidos.

In the Tring Museum 10 ♂♂, 9 ♀♀, from: Cayenne; Igarapé, Pará (W. Hoffmanns); Obidos, October and November 1904 (M. de Mathau).

In coll. Oberthür a small series from Maroni, Guiana, and Pará.

b. P. triopas mithras Grose-Smith (1902).

Papilio triopas, Gray, *Ilc.* (Demerara).

Papilio mithras Grose-Smith, *Rhop. Exot.* iii. *Pap.* t. 23. fig. 1. ♂ (1902) (British Guiana).

♂ ♀. Spots paler and smaller than in the preceding, the last spot of the hindwing, above, especially smaller.—The differences may not be constant. We have seen only a few specimens.

Hab. British Guiana.

In the Tring Museum 1 ♀ from Bartica, British Guiana, 22. v. 1904 (R. Haensch).

14. *Papilio chabrias* Hew. (1852).

Papilio chabrias Hewitson, *Trans. Ent. Soc. Lond.* (2). ii. p. 23. t. 6. fig. 1. ♀ (1852) (Amazons); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 20. n. 247 (1847) (Cayenne; N. Brazil); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 69. n. 315 (1852) (Ega); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Upper Amazons; forest); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 80. n. 332 (1856) (Ega); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 343, 358 (1861) (Upper Amazons, ♂ ♀; subspecies of *triopas*); id., *Journ. Entom.* i. p. 226. n. 17 (1862) (Upper Amazons; "local modification" of *triopas*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 292. n. 37 (1864); Oberth., *Et. d'Ent.* iv. p. 96. n. 294 (1880) (Teffé; "Para" false); Kirby, *Cat. Diurn. Lep.* p. 528. n. 66A (1871) (Upper Amazons); Hopff., *Stett. Ent. Zeit.* xl. p. 51. n. 10 (1879) (Amazons, Peru); Staud., *Exot. Tagf.* p. 14 (1884) (Upper Amazons); Hahnel, *Iris* iii. p. 307 (1890) (Jurimáguas); Haase, *Untersuch. Mimicry* i. p. 79 (1893); Michael, *Iris* vii. p. 214 (1894) (Sao Paulo de Olivença).

Papilio nymphas Grose-Smith, *Rhop. Exot.* iii. *Pap.* t. 23. fig. 2. ♀ (1902) (Ecuador; "Para" false).

♂ ♀. In structure like *triopas*. Forewing of both sexes with a submarginal row of spots, which are often missing in female independently of locality. Patch of hindwing more distal than in *triopas*, therefore the spots around apex of cell larger, while the cell-spot is smaller.

Hab. Upper Amazons, from Ega to the eastern slopes of Ecuador and Peru.

In the Tring Museum 5 ♂♂, 6 ♀♀, from: R. Chuchuras, affluent of R. Palcazu, Huánuco, Peru, 320 m. (W. Hoffmanns); R. Cachyaco, affluent of R. Huallaga, Peru (Maxwell Stuart); Iquitos; S. Paulo de Olivença.

In coll. Oberthür a series from Moyobamba; S. Paulo de Olivença; Tocantins; Tefü.

15. *Papilio coelus* Boisd. (1836). (Pl. IV. fig. 2).

♀. *Papilio coelus* Boisduval, *Spec. Gén. Léop.* i. p. 289. n. 117 (1836) (Cayenne); Doubl., Westw. and Hew., *Gen. Diurn. Lep.* i. p. 18. n. 209 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 53 n. 253 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 66. n. 268 (1856).

♀. *Papilio vertumnus* var., Bates, *Trans. Ent. Soc. Loud.* (2). v. p. 340, 355 (1861).

♀. *Papilio vertumnus*, Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 292. n. 42 (1864) (*partim*).

♀. *Papilio vertumnus* var. d. *P. coelus*, Kirby, *Cat. Diurn. Lep.* p. 525. sub n. 61 (1871).

♂. *Papilio vercingetorix* Oberthür, *Et. d'Ent.* xii. p. 5. n. 10. t. 7. fig. 51 (1888) (French Guiana).

♂♀. Palpus black. Abdomen in male with a tiny red dot before claspers, in female with a red spot around vaginal cavity, no red scales dorsally at apex of eighth tergite. Sexes similar in pattern; forewing with a white patch in apex of cell extending on to disc, larger in female than in male, washed out at the edges.—A red patch or band on hindwing close to cell, consisting in male of four spots, in female of six, in this sex the band being continued to abdominal edge; tooth R³ prominent, almost pointed, the following two teeth also somewhat pointed.

On *underside* the white patch of forewing a little larger than above.—Red band of hindwing paler red than above and the spots in female smaller, in male two additional spots between M² and anal angle.

Scent-organ white.

Hab. French Guiana.

Only two specimens known, the type (♀) of *coelus* being in Mus. Paris, and the type (♂) of *vercingetorix* in coll. Charles Oberthür.

16. *Papilio quadratus* Stand. (1890).

Papilio quadratus Staudinger, *Iris* iii. p. 337. t. 3. fig. 1. ♂ (1890) (Manicoré); id., *L.c.* iv. p. 61 (1891).

♂♀. Sexes similar. Palpus black. Mid- and hindtibiae of male slightly dilated, hairy, but also bearing many bristles. Abdomen beneath with minute red spot before claspers in male, and with large spot around vaginal cavity in female, no red scales dorsally at apical edge of eighth segment. Forewing very long, costal and distal margins almost parallel in male. Hindwing with a creamy patch consisting of five discal spots and (in ♂) a small cell spot; tooth R³ somewhat projecting in female, while the wing is strongly rounded at apex, being produced anally.

On *underside*, the hindwing bears a red spot close to anal angle.

Scent-organ with a very broad stripe of white wool; this stripe not quite extending to base, where there is a brush of white spreading hairs.

Genitalia: ♂. Ninth tergite with a conical spinelike process at each side of base of tenth tergite. Harpe half the length of the clasper, bearing four teeth, all projecting ventrad and curved inward, the apical one very long, the next two shorter, the most proximal one being minute.

Early stages not known.

Hab. Upper Amazons.

Two subspecies.

a. *P. quadratus quadratus* Stand. (1891).♂. *Papilio quadratus* Staudinger, *ll.c.*

Forewing with yellow quadrate spot M^1-M^2 in male. The female not known. This may be only an aberrant individual.

Hab. Manicoré, Rio Madeira.

b. *P. quadratus spoliatus* Stand. (1898).

♂ ♀. *Papilio quadratus* var. *spoliatus* id., *l.c.* xi. p. 138 (1898) (Sao Paulo de Olivença; Pebas; Iquitos); Grose-Smith, *Rhop. Exot.* iii. *Pap.* t. 17, fig. 1 ♂, 2 ♀ (1899); Staud., *l.c.* xi. p. 376 (1899).

♂ ♀. Forewing without markings, or the spot M^1-M^2 vestigial above and distinct though small below.

Hab. Upper Amazons.

In the Tring Museum 2 ♂♂, 1 ♀, from: R. Jurna; S. Paulo de Olivença.

In coll. H. J. Adams 6 ♂♂, 4 ♀♀, from the Upper Amazons.

17. *Papilio pizarro* Stand. (1884).

♂ ♀. *Papilio pizarro* Staudinger, *Exot. Tuff.* p. 18, t. 13. ♂ (1884) (Sao Paulo de Olivença, Pebas, Jurimáguas; ♀ *partim*); Hahnel, *Iris* iii. p. 286 (1890) (Pebas); id., *l.c.* p. 307 (1890) (Jurimáguas); Haase, *Untersuch. Mimicry* i. p. 79 (1893); Staud., *Iris* xi. p. 141 (1898).

♂ ♀. Palpus black. Abdomen of male without red scales before claspers, of female with red spot behind vaginal cavity and at apex of seventh sternite, but no (or very few) red scales dorsally and laterally at apex of eighth segment, in the female of *P. cutorina* this segment being edged with red.—Forewing without white fringe-spots, no markings on disc.—Hindwing with creamy patch consisting of three or four spots in male, of three to six in female; D^3 short, transverse, much shorter than D^1 .

Mid- and hindtibiae of male slightly incrassate, hairy; foretibia thinner, spinose, with comparatively few short hairs.

Scent-organ grey, with a streak of small erect scales as in *P. chabrias* and *steinbachi*.

Hab. Upper Amazons.

In coll. Oberthür from: Chambiriyacu; Tarapoto; Pebas.

In coll. H. Grose-Smith from Yurimáguas; and in coll. H. J. Adams from the Upper Amazons.

As Dr. Staudinger, *Iris* xi. p. 141 (1898), when comparing the females of *P. pizarro*, *bolivar*, and *cutorina* with one another, did not find any constant character, except size, by which to separate *bolivar* and *cutorina*, and mentions as a distinguishing character between *cutorina* and *pizarro*, besides the greater expanse of *cutorina*, only a creamy spot situated in *cutorina* on the underside of the hindwing at the abdominal margin, which character is not constant, we append here a short exposition of those external characters by which the females of the three insects can be recognised. In the Godman collection there is a female received from Standinger as *pizarro*, being labelled "original." This female is *bolivar*.

I. Palpus black; a red spot behind vaginal cavity and in front of it, no red scales at apex of eighth segment dorsally and laterally; fringe of forewing quite black or with a white scale here and there, not bearing distinct spots; cell of hindwing narrow, vein D^3 transverse, much shorter than D^1 ; spot $M^2-(SM^1)$ absent or small:—Female of *pizarro*.

2. Palpus and apex of abdomen as before, or the latter more extended red; fringe of forewing with more or less distinct white spots; lower angle of cell of hindwing acute, D^3 oblique, as long as D^4 , being usually longer, rarely shorter; spot M^2 —(SM^1) about half the size of spot M^1 — M^2 :—Female of *bolivar*.

3. Palpus red; apex of eighth abdominal segment red all round, the red scaling forming a ring around the anal segment; fringe of forewing with sharply marked white spots; D^3 of hindwing shorter than D^4 :—Female of *cutorina*.

18. *Papilio steinbachi* Rothsch. (1905). (Plate IV. fig. 5. ♂, 6. ♀).

♂ ♀. *Papilio steinbachi* Rothschild, *Entom.* p. 125 (1905).

♂ ♀. Palpus black. Abdomen of male without red scaling before claspers; of female with red scaling around vaginal cavity, but not dorsally at apex of eighth segment. Tibiae of male somewhat dilated and hairy.—Forewing in male with white or buffish double spot M^1 —(SM^1); in female with a larger white patch consisting of a minute cell-streak, a very large spot M^1 — M^2 , a triangular spot before M^1 and a streak behind M^2 .—Hindwing with red patch in both sexes, the last spots being more or less white in male, this colour only indicated in female.

On *underside* both sexes with a red spot close to anal angle, separated from the discal spots.

Scent-organ: fold grey inside; a broad stripe of small scales as in *P. triopas*, the scales of the same type as in that species, but larger.

Genitalia: ♂. Ninth tergite with conical lateral process as in the allied species. Harpe about two-thirds the length of the clasper, curved, narrow, with short but strong teeth from base to apex.

Early stages not known.

Hab. Eastern Bolivia.

In the Tring Museum 5 ♂♂, 1 ♀ from: Sara, S. Cruz de la Sierra, end of February to June 1904 (J. Steinbach); Mapiri.

19. *Papilio klagesi* Ehrm. (1904). (Pl. V. fig. 20).

♀. *Papilio klagesi* Ehrman, *Ent. News* xv. p. 215 (1904) (Suapure, Venezuela).

The male is not known.

♀. Palpus and apex of abdomen black, no red spot behind or in front of vaginal cavity.—Fringe of forewing quite black, lower angle of cell completely rounded off; a white band from M^1 to SM^2 .—Hindwing: fringe-spots white, vestigial or entirely absent, this being the only case in the present group of *Aristolochia*-*Papilio*s of the fringe of the hindwing not being distinctly spotted; tooth R^3 slightly prominent, while the others are very obtuse and short; band of discal spots somewhat pinkish, upper two spots small, more distal than the last four, which are contiguous; M^2 originating almost on a level with R^1 , D^3 shorter than D^4 , transverse, D^4 nearly as long as upper partition of M .

Anal segment ventrally with very numerous short stiff yellowish bristles. In front of vaginal cavity a low ridge continued distad on each side of the cavity; the proximal portion of this ridge densely clothed with very short stiff hairs; behind the vaginal aperture a long smooth process, convex on proximal side, excavate on distal side, rounded at apex.

Hab. Canra River, Orinoco.

In the Tring Museum 3 ♀♀ from Suapure, Canra R., February and March 1899 (S. M. Klages).

20. *Papilio aeneas* L. (1758).

♂. *Papilio Eques Trojanus aeneas* Linné, *Syst. Nat.* ed. x. p. 461. n. 15 (1758) ("Asia").

♀. *Princeps dominans marcius* Hübnér, *Samml. Exot. Schmett.* i. t. 122 (1806—?).

♂ ♀. *Papilio aeneas*, Erichson, in Schomb., *F. F. Brit. Guiana* p. 593 (1848) (♀ = *marcius*).

♂ ♀. Palpus black; posterior abdominal segments of male without red markings, there being in the female a restricted red spot situated behind vaginal cavity, neither the seventh nor eighth segment as a rule bearing any red scales at the edge. Fringe of forewing black, showing rarely vestiges of white spots in female. Mid- and hindtibiae of male densely hairy, except base, incrassate, especially the hindtibia, foretibia and tarsi simply spinose. Scales of red patch of hindwing of male above entire; in female the scales also rounded at apex, but seldom entire, bearing from three to five teeth, very few scales being only bidentate; on the underside the white scales covering the red ones nearly all sharply tridentate in female, only a few having two teeth, while in male the majority is bidentate. No opalescent gloss on upper side of hindwing. White patch on forewing of female washed out at edges.

Neuration: D³ of hindwing about as long as D⁴, often considerably longer, however in one of our males much shorter.

Scent-organ: wool blackish hair-brown.

Genitalia: ♂. Tenth tergite a very little longer than the sternite; apical edge of ninth tergite somewhat dilated near the tenth tergite and denticulate. Harpe reaching close to apex of clasper, bearing at the apex from two to six heavy teeth, and at the ventral edge beyond the middle one more tooth, the distal portion of the ventral edge being sometimes minutely denticulate.—♀. No strongly elevate ridge in front of the vaginal cavity; posterior edge of cavity rounded, slightly incrassate, partly covering the cavity, rest of postvaginal area membranous, transversely wrinkled.

Early stages not known.

Hab. The Guianas; Amazons from Pará upwards; eastern slopes of Andes of Peru and Bolivia; Upper Orinoco.

a. *P. aeneas aeneas* L. (1758).

Roesel, *Ins.-Belust.* iv. B. p. 24. t. 2. fig. 2. ♂ (1755).

♂. *Papilio Eques Trojanus aeneas* Linné, *Lc.* ("Asia"; citat. *partim*); Kleem., in Roesel, *Lc.* (ed. ii., 1761) (Surinam); Linné, *Mus. Lud. Ultr.* p. 197. n. 16 (1764); Houtt., *Naturl. Hist.* i. 11. p. 198. n. 15 (1767); id., *Syst. Nat.* ed. xii. p. 747. n. 16 (1767); Fabr., *Syst. Ent.* p. 448. n. 23 (1775) ("India"); Goeze, *Ent. Beytr.* iii. 1. p. 36. n. 16 (1779) (cit. Sebac excl.); Cramer, *Pap. Erot.* iii. p. 156. t. 279. fig. C. D (1780) (Surinam); Fabr., *Spec. Ins.* ii. p. 8. n. 32 (1781) (citat. Cram. excl.); Jabl. and Herbst, *Naturs. Schmett.* ii. p. 53. n. 19. t. 9. fig. 5, 6 (1784) (*partim*); Fabr., *Mont. Ins.* ii. p. 5. n. 35 (1787); Esper, *Ausl. Schmett.* p. 40. n. 15. p. 60 (1788) (*partim*, ♀); Gmelin, *Syst. Nat.* i. 5. p. 2233. n. 16 (1790) (*partim*); Jung, *Alphab. Verz.* p. 11 (1791) (synon. *partim*); Fabr., *Ent. Syst.* iii. 1. p. 17. n. 50 (1793) (citat. *partim*).

Papilio Eques aeneas Linné, *Syst. Nat.* ed. Lange p. 461. n. 15 (1760).

Papilio (Tros) aeneas, Müller, *Naturs.* v. 1. p. 570. n. 16 (1774).

Papilio (aeneas), Meerburgh, *Afb. Zeldz. Gew.* t. 19. ♂ (1775).

Papilio Eques Trojanus aeneides Esper, *Ausl. Schmett.* t. 15. fig. 4 (1788).

Parides gorgasus Hübnér, *Verz. bek. Schmett.* p. 87. n. 909 (1818?) (*partim*; *nom. novum loc.* "aeneas Cram. 279. A—D").

Papilio aeneas, Godart, *Enc. Méth.* ix. p. 33. n. 24 (1819) (*partim*; "♀" only); Boisdu., *Spec. Gén. Lép.* i. p. 286. n. 112 (1836) (*partim*; "♀" only); Constable, *Miscell. Butt.* p. 140. t. 13. ♂ (1832) ("Cochin China"); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 12 (1845) (Demerara; syn. *partim*); id., Westw. and Hew., *Gen. Diurn. Lep.* i. p. 18. n. 202 (1846) (Guiana; cit. Cram. *partim*); Erichs., in Schomb., *F. F. Brit. Guiana* p. 593 (1848); Gray, *List Lep. Ins. Brit.*

Mus. i. Pap. p. 65. n. 264 (1856) (*partim*; Demerara); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 342, 357 (1861) (*partim*; Guiana); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 295. n. 80 (1864) (*partim*; Surinam; Guiana); Guenée, *Ann. Soc. Ent. France* p. 305 (1867) (synonymy); Butler, *Cat. Diurn. Lep. descr. Fabric.* p. 236. n. 11 (1869) (Demerara; *synon. partim*); Kirby, *Cat. Diurn. Lep.* p. 528. n. 63 (1871) (*partim*; Guiana); Moschl., *Verh. Zool. Bot. Ges. Wien* xxvii. p. 295 (1876) (Surinam); Auriv., *K. Sv. Vet. Ak. Handl.* xix. 5. p. 21. n. 16 (1882) (*Receusio critica*); Moschl., *l.c.* xxxii. p. 303 (1883) (Surinam); Haase, *Untersuch. Mimicry* i. p. 79 (1893).
Papilio marcius, Doubleday, *List Lep. Ins. Brit. Mus.* i. p. 12 (1845) (Demerara).
 ♂. *Papilio bochus* Lucas, *Rev. Zool.* (2). iv. p. 191 (1852) (Cayenne).

♂. Green spot distant from cell, usually shortest in basi-distal direction, mostly shorter behind SM² than before this vein. Spots on underside of hindwing red, separate, spot M²—(SM¹) usually the largest.

♀. Dichromatic, the forewing being sometimes without the usual white patch. Red band of hindwing distant from cell, the two spots M²—SM² confluent, or at least standing close together.

a'. ♀-f. *specularis* nov.—Forewing: A large white spot R³—M¹, a smaller one in cell, and usually a small spot before R¹ and another behind M¹.—The ordinary female.

b'. ♀-f. *dido* nov.—Forewing: No white patch. A rare form.

Hab. of *P. aeneas aeneas*: The Guianas.

In the Tring Museum 16 ♂♂, 15 ♀♀ from: Cayenne; Surinam; Rio Demerara, Essequibo R., and Camaria (January 1904, R. Haensch), Brit. Guiana.

b. *P. aeneas marcius* Hübn. (1806—?).

♀. *Princeps dominans marcius* Hübner, *Samml. Exot. Schmett.* i. t. 122 (1806—?).
 ♀. *Priamides marcius* id., *Verz. bek. Schmett.* p. 87. n. 900 (1818?) (syn. excl.).
 ♀. *Papilio marcius*, Boisduval, *Spec. Gén. Lép.* i. p. 288. n. 115 (1836); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 55. n. 259 (1856) (Pará); Wallace, *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Amazons; forest); Gray, *List Lep. Ins. Brit. Mus. i. Pap.* p. 67. n. 274 (1856) (Pará).
 ♀. *Papilio echelus*, Doubleday, Westw. & Hew. (*non* Hübner, 1806—?, err. det.), *Gen. Diurn. Lep.* i. p. 18. n. 210 (1846) (*partim*).
 ♀. *Papilio parsodes* Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 54. n. 256. t. 8. fig. 4. ♀ (1852) (*partim*, ♀ only; Pará).
 ♂. *Papilio aeneas*, id., *l.c.* p. 52. n. 249 (1852) (syn. excl.; Pará); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 256 (1854) (Pará; forest); Gray, *List Lep. Ins. Brit. Mus. i. Pap.* p. 65. n. 264 (1856) (*partim*; Pará); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 342, 357 (1861) (*partim*; Pará); id., *Journ. Entom.* i. p. 226. n. 14 (1862) (*partim*; Pará); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 295. n. 80 (1864) (*partim*; Pará); Bates, *Natural. Riv. Amaz.* p. 26 (1864) (Pará, ♂ in swampy shades, ♀ in more open places); Guen., *Ann. Soc. Ent. France* p. 307 (1867); Kirby, *Cat. Diurn. Lep.* p. 528. n. 63 (1871) (*partim*; Pará); Oberth., *El. d'Ent.* iv. p. 95. n. 291 (1880) (♂ = *bochus*, ♀ = *marcius* = *parsodes*; Pará; Amazons, *partim*); Hübner, *Iris* iii. p. 212 (1899) (Pará).

Papilio lysander local var. *parsodes*, Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 344 (1861) (♀ sub *synon.*).

Parides aeneas, Kirby, in Hübner, *Samml. Exot. Schmett.* ed. ii. p. 90. t. 122. fig. 3, 4 (190—?).

♂. As in *P. a. aeneas*, last but one spot on underside of hindwing rather smaller.

♀. White patch of forewing usually reaching backwards to M², the posterior spot being larger than in the preceding. The central spots of band of hindwing larger and closer together, spot C—SC² present.

Hab. Lower Amazons: Pará district, probably found farther south on the Tocantins.

In the Tring Museum 5 ♂♂, 3 ♀♀, from: Pará (Stuart); Igarapé (W. Hoffmanns).

c. P. aeneas linus subsp. nov. (Pl. V. fig. 28).

♂. Similar to the preceding; spots R^2-M^2 of underside of hindwing paler, close together, nearer to cell, spot R^3-M^1 longer than the distance of this spot from cell.

♀. White patch of forewing as in *P. a. aeneas*, consisting of a large spot R^3-M^1 , a smaller cell-spot, a minute spot R^2-R^3 , and a small streak behind M^1 .—Red band of hindwing broad, extending from R^1 to abdominal margin, touching cell or nearly, spot R^3-M^1 the longest, about four times as long as broad, the spots close together above, the last one standing a little separate; on underside the first spot minute, separate, the last small, also separate, the four others nearly as large as above.

Hab. Middle Amazons: Santarem; Obidos (*type*); Massauary.

Bates did not meet with *aeneas* on the Middle Amazons.

In the Tring Museum 1 ♂, 1 ♀ from Obidos and Santarem.

In coll. Oberthür from Massauary.

d. P. aeneas damis subsp. nov.

Papilio aeneas, Druce, *Proc. Zool. Soc. Lond.* p. 245. n. 4 (1876) (Ucayali).

♂. Green patch of forewing larger than in the three preceding forms, touching cell in most specimens, extending basad to SM^3 or even beyond. Spots R^2-M^2 of underside of hindwing pinkish white, nearer the cell than in *P. a. aeneas* and *marcius* and closer together, spot M^1-M^2 sometimes obsolescent.

♀. Dichromatic.

a'. ♀-f. *pyromelas* nov. (Pl. VI. fig. 37).—This is the usual form. Forewing without white patch, deeper black than in the other subspecies, with vestiges of white fringe-spots.—Hindwing: red band broad, much broader than the black distal area, the spots close together, the central ones touching cell as in female of *linus*, or the band 3 or 4 mm. distant from cell, in this case its inner edge being concave; no spot before R^1 ; spot at abdominal margin (the sixth) separate, distinct or vestigial or absent; scales of red band either mostly entire or finely denticulate; the band narrower on underside, sixth (last) spot small or absent.—This female differs from that of *P. drucei* especially in cross-vein D^3 of hindwing being at least as long as D^1 , and in the apex of the abdomen bearing a red spot only behind vaginal cavity, there being no red scales at the edges of segments 7 and 8; the forewing is also more opaque.

b'. ♀-f. *eucharía* nov. (Pl. VI. fig. 35).—Apparently a very rare form, which we thought first to represent a distinct species. Besides the specimen figured (from the Perené River) we have seen only one other, which is in the collection of Mr. H. J. Adams, being also found in the Perené valley (5000 ft., May—June 1902, W. Watkins).—Forewing with large white patch. Eighth abdominal segment more extended red than in other females of *P. aeneas*.

Hab. of P. a. damis: East Peru.

In the Tring Museum: 5 ♂♂, 9 ♀♀, from: Pozuzu, Huánuco, 800—1000 m. (W. Hoffmanns); R. Chuchuras, Huánuco, 320 m. (W. Hoffmanns); R. Perené, March 1900 (Simons); La Merced, Chanchamayo, May and June 1903, 2500 ft. (Watkins & Tomlinson); La Union, R. Huacamayo, Carabaya, 2000 ft., November 1904 to January 1905 (G. Ockenden); Pachitea.

e. P. aeneas locris subsp. nov. (Pl. VI. fig. 26).

♂. Like *damis*, red area of hindwing rather larger, and spot M^1-M^2 of underside of hindwing mostly obliterated.

♀. Similar to the Guiana ♀-f. *specularis*.—Forewing deeper black, the apical area being less transparent; cell-patch larger, extending from M^1 to lower angle, reaching nearly across cell, the spots rather more sharply defined and spot R^3-M^1 longer; fringe with or without minute white spots.—A row of six spots on hindwing, standing nearer cell than outer margin, but being quite remote from cell, all separate, spot R^3-M^1 the largest; fifth spot smaller than first, and the sixth vestigial, both small on underside and separate.

Hab. Bolivia.

In the Tring Museum: 3 ♂♂, 2 ♀♀, from: Maipiri; Province Sara, S. Cruz de la Sierra, April—June 1904 (J. Steinbach).

f. P. aeneas boliviar Hew. (1850).

Papilio boliviar Hewitson, *Trans. Ent. Soc. Lond.* (2). i. p. 97. t. 10. fig. 2. ♂ (1850) (Amazons); Doubl., Westw. and Hew., *Gen. Diurn. Lep.* ii. p. 529 (1852); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 57. n. 265. t. 10. fig. 7. ♀ (1852) (Ega); Wall., *Trans. Ent. Soc. Lond.* (2). p. 256. (1854) (Upper Amazons; forest); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 69. n. 280 (1856) (Ega); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 342, 357 (1861) (Upper Amazons); id., *Journ. Entom.* i. p. 226. n. 15 (1862) (Upper Amazons, abundant, "local modification" of *aeneas*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 295. n. 81 (1864) (Ega); Kirby, *Cat. Diurn. Lep.* p. 528. n. 63a (1871) (Upper Amazons); Hopff., *Stett. Ent. Zeit.* xl. p. 50. n. 7 (1879) ("Brazil"); Oberth., *Et. d'Ent.* iv. p. 96, 117. n. 233 (1880) (Teffé; Sao Paulo de Olivença; Pebas; Iquitos); Stand., *Exot. Tagf.* p. 19 (1884); Hahnel, *Iris* iii. p. 275 (1890) (S. Paulo de Olivença); id., *l.c.* p. 307 (1889) (Jurimáguas); Haase, *Untersuch. Mimicry* i. p. 79 (1893); Michael, *Iris* vii. p. 214 (1894) (Sao Paulo de Olivença).

Bates, *l.c.*, considered this to be the Upper Amazonian form of *P. aeneas*, in which he was doubtless right. The differences, though conspicuous enough, are not very trenchant.

♂. Green patch of forewing as in the Peruvian subspecies, spot M^2-SM^2 proximally rather more reduced than in most Peruvian and Bolivian males. Red area of hindwing deeper red and smaller, the spots around the cell being reduced; these spots without bright red tips, or only spot R^3-M^1 with small red dot at apex; fringe with small white spots.—On underside all the spots of hindwing cream-colour, one or the other with a few red scales at the edge, spot M^2-SM^2 much the largest.

♀. Forewing without white patch; fringe with white spots.—Hindwing with the band cream-colour instead of red, last spot separate, often absent; width of band variable.

Hab. Upper Amazons; Orinoco.

In the Tring Museum: 8 ♂♂, 5 ♀♀, from: Maipures, Orinoco, December 1898 (Cherrie); R. Cachynco, affluent of R. Huallaga (Stuart); S. Paulo de Olivença; Teffé, January 1904 (M. de Mathan).

The female resembles that sex of the Peruvian subspecies except in the colour of the band. One of our males of the Bolivian subspecies has all the spots of the underside of the hindwing cream-colour and on the upperside only the two middle spots tipped with bright red.

21. *Papilio dardanus* Fabr. (1793).

- ♂. *Papilio Eques Trojanus dardanus* Fabricius, *Ent. Syst.* iii. 1. p. 10. n. 29 (1793) (Brazil).
 ♀. *Papilio Eques Trojanus tros* id., *l.c.* n. 30 (1793) (Brazil).
 ♂. *Papilio opleus* Godart, *Enc. Méth.* ix. p. 33. n. 22 (1819) (Brazil;—mutilated specimen).
 ♂. *Papilio dardanus*, id., *l.c.* p. 73. n. 134 (1819) (Brazil); Lucas, *Lép. Esot.* p. 26. t. 13. fig. 2 (1835);
 Boisd., *Spec. Gén. Lép.* i. p. 304. n. 139 (1836) (Brazil); Lucas, in Guér., *Diét. Pitt. Hist. Nat.*
 vii. p. 47 (1838); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 13 (1845) (Brazil).
 ♀. *Papilio tros*, Godart, *l.c.* n. 135 (1819) (Brazil); Donovan., *Nat. Repos.* ii. t. 29 (1823) (Brazil);
 Boisd., *l.c.* p. 304. n. 139 (1836); Doubl., *l.c.* p. 13 (1844); Prillw., *Stett. Ent. Zeit.* xxvi. p. 129
 (1865) (Corcovado).
 ♂ ♀. *Papilio dardanus*, Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 194 (1846); Gray,
Cat. Lep. Ins. Brit. Mus. i. *Pap.* p. 44. n. 224 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 60.
 n. 237 (1856) (Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 5. n. 75 (1857);
 Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 294. n. 78 (1864) (S. Brazil); Butler, *Cat. Diurn. Lep.*
descr. Fabric. p. 236. n. 10 (1869); Kirby, *Cat. Diurn. Lep.* p. 531. n. 77 (1871) (Brazil); Burm.,
Descr. Rép. Argent. v. Lép., Atlas p. 8. n. 18 (1879) (Corcovado); Oberth., *Et. d'Ent.* iv. p. 91.
 n. 283 (1880) (Brazil); Haase, *Untersuch. Mimicry* i. p. 79 (1893).

♂ ♀. Palpus black; posterior abdominal segment not spotted red in male, there being in female a spot only behind vaginal cavity; vein R¹ of hindwing more distal than M²; tail long, spatulate, tooth M¹ also somewhat prolonged. Red spots of hindwing not opalescent. Scales behind SM² of underside of forewing elongate, entire in both sexes; scales of buffish-green patch of forewing and most scales of the red patch on upperside of hindwing of male also entire. Mid- and hindtibiae of male incrassate, densely covered with minute hairs, the spines being small and almost restricted to the underside; foretibia spinose. Fore- and midtarsi in male about half as long again as tibiae; not quite so long in female. In male sometimes a greyish band on underside of forewing across apex of cell, corresponding to the band of female.

Scent-organ: fold large, containing a very narrow stripe of long grey wool.

Genitalia: ♂. Tenth tergite a little longer than the sternite, bearing proximally on each side some irregular prominent teeth. Harpe very broad, rounded and strongly dentate at apex, one large conical tooth ventrally in middle. Penis-sheath acuminate, the tip a little curved over the orifice.—♀. Some distance proximally of vaginal orifice on both sides a large, triangular, somewhat rounded lobe, convex on outer side; postvaginal area transversely wrinkled, mesially impressed; proximal edge of this impression somewhat raised, especially mesially. Bristles of anal segment gradually tapering to a fine point.

Early stages not known.

Hab. Brazil: Province of Rio de Janeiro.

In the Tring Museum: 21 ♂♂ and 16 ♀♀.

22. *Papilio orellana* Hew. (1852).

- Papilio orellana* Hewitson, *Trans. Ent. Soc. Lond.* (2). ii. p. 23. t. 5. fig. 2. ♂ (1852) (Amazon);
 Doubl., Westw. and Hew., *Gen. Diurn. Lep.* ii. p. 529 (1852); Gray, *Cat. Lep. Ins. Brit. Mus.* i.
Pap. p. 51. n. 246 (1852); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 256 (1854) (Upper Amazons;
 forest); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 65. n. 261 (1856) (Ega); Bates, *Trans. Ent.*
Soc. Lond. (2). v. p. 343, 358 (1861) (♂, Ega); id., *Journ. Entom.* 1. p. 226 n. 18 (1862) (Ega);
 Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 295. n. 79 (1864) (Ega); Kirby, *Cat. Diurn. Lep.*
 p. 528. n. 64 (1871) (Ega); Oberth., *Et. d'Ent.* iv. p. 116. n. 270⁶⁶ (1880) (Iquitos); Staud.,
Esot. Tagf. p. 19. t. 13. ♀ (1881) (Iquitos); Hahnel, *Iris* iii. p. 275 (1890) (Sao Paulo de
 Olivença).

Palpus black; M² of hindwing more distal than R¹; tooth R³ prominent.

♂. Forewing without markings, except the white fringe-dots, which are

sometimes vestigial; blue-black, scales feebly dentate, those of upper layer narrow in apical area: a large purplish red discal area on hindwing, entering cell, extending from SC^2 beyond M^2 , non-opalescent, the red spots of the underside shining through; scales of this patch entire. On *underside* scales behind SM^2 of forewing and some before SM^2 elongate, entire. Tibiae simple, spinose. Abdomen with red spot only at base.

♀. Forewing similar to that of male, less blue, scales dentate. A red band on hindwing consisting of six spots, first and second smallest and usually isolated, third, fourth and fifth much longer than broad, scales dentate; the spots smaller below, paler, and all separated.

Scent-organ: white wool from base to apex of fold, the wool short, even, as if shorn. In one of our specimens there is a large cinnamon streak on fold (SM^1).

Genitalia: ♂. Tenth tergite with small tubercle on each side dorsally at base, the lateral edge being somewhat dilated proximally of the tubercle. Clasper rounded; harpe of a similar type as in *P. lysander* and allies, long, reaching close to apex of clasper, rounded-truncate, with about six large apical teeth, no tooth at ventral margin proximally of middle. Penis-sheath acuminate.

Hab. Upper Amazons.

In the Tring Museum: 3 ♂♂, 2 ♀♀, from: S. Paulo de Olivença; Iquitos (Stuart).

In coll. Oberthür from: Iquitos, November; Cavallo Cocho, May—July.

In coll. H. J. Adams a series of 4 ♂♂, 5 ♀♀, from the Upper Amazons.

23. *Papilio sesostris* Cram. (1779).

♂. *Papilio Eques Trojannus sesostris* Cramer, *Pap. Ecot.* iii, p. 34, t. 211, fig. F. G (1779) (Surinam).

♀. *Papilio Eques Trojannus tullus*, id., *l.c.* iii, p. 153, t. 277, fig. C. D (1780) (Surinam).

Palpus black in both sexes, M^2 of hindwing on a level with R^1 or more distal.

♂. Forewing: a large green patch from M^1 to hinder margin, contiguous with cell, consisting of three partitions, the first and second or all three acuminate distally, the scales composing the patch broad, rounded; rarely a streak of dispersed green scales in cell; rest of wing velvety black, upper scales narrower, lanceolate, nearly all entire; under scales dentate, broad.—Hindwing with or without red spot behind M^2 , the spot not being opalescent.

On *underside* the upper scales in posterior area of forewing entire and lanceolate, being bidentate on rest of wing; occasionally small creamy patches posteriorly on disc.—Hindwing always with three large red contiguous spots R^3 —(SM^1), more or less shaded with white, and a small spot on abdominal fold, there being usually also a red dot R^1 — R^2 near margin and often a small spot R^2 — R^3 in front of the patch of three; a submarginal dot SC^2 — R^1 does not seem to be ever present. Tibiae not incrassate, spinose.

♀. Forewing opaque, being very little paler distally than basally; there are always at least two creamy or buffish-white patches on forewing; upper scales of forewing partly lanceolate, acuminate.—Hindwing: red band broad and continuous either from R^2 or R^3 to abdominal margin, rarely represented by only two isolated spots; spots SC^2 — R^2 usually present, isolated, small as compared with the posterior spots; red upper scales nearly all entire, except near abdominal margin.—Scales on *underside* dentate, a very few in the white patch of the forewing being acuminate.

Scent-organ: white wool not extending to base, the basal third of the fold

being covered with long, half-erect, rounded-truncate or feebly sinuate, purplish black scales, there being also a brush of long hairs; the greyish white scales at the discal side of the patch of wool nearly all entire.

Genitalia: ♂. Tenth tergite a little longer than the long acuminate lobes of the sternite; edge of ninth tergite minutely serrate. Harpe long, gradually narrowed distally, longitudinally impressed; apex rounded, either entire or denticulate, the most ventral tooth being usually somewhat enlarged; ventral edge with a solitary small conical tooth proximally; a compressed, tuberculiform ridge on clasper close to apex of harpe. Penis-sheath obliquely truncate, the proximal (or ventral) edge produced into an abrupt short-pointed lobe.—♀. Vaginal orifice surrounded by a ridge which is widened behind into a broad lobe; this lobe rounded, concave on distal side, somewhat like an oyster-shell in outline, bent forward, lying over the vaginal orifice; the edge of this lobe a little incrassate centrally; proximally of the vaginal ridge there is on each side a large, irregularly triangular lobe which is finely hairy.

Early stages not known.

Hab. Mexico to Bolivia and Goyaz.

a. P. sesostris zestos Gray (1852).

Papilio sesostris, Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 19. n. 213 (1817) (*partim*); Reak., *Proc. Ent. Soc. Philad.* ii. p. 139. n. 9 (1863) (*synon. partim*; Honduras); Weidem., *ibid.* p. 148 (1863) (Central America; *partim*); Dist., *Proc. Ent. Soc. Lond.* p. xiv. (1876) (Costa Rica); Hoopff., *Stett. Ent. Zeit.* xl. p. 50. n. 9 (1879) (*partim*; Honduras).

Papilio zestos Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 47. n. 235. t. x*. fig. 5. ♀ (1852) (Honduras); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 62. n. 248 (1856) (Honduras); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 340 (1861) (Honduras); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 292. n. 39 (1864) (Mexico; Honduras); Stand., *Exot. Tagf.* p. 13 (1884) (*partim*; Central America); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. 190. n. 1 (1890) (Guatemala; Brit. Honduras; Nicaragua; Honduras).

Papilio sesostris, local var. *zestos*, Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 355 (1861) (*partim*; Honduras).

Papilio sesostris var. *a. P. zestos*, Kirby, *Cat. Diurn. Lep.* p. 525. sub n. 60 (1871) (Honduras).

♂. Hindwing always with red spot on upperside; on underside the band of spots R³—(SM¹) almost at right angles to the veins, the last of these three spots elliptical, not being produced distad, spot on abdominal fold rather large.

♀. Patch R³—M¹ of forewing contiguous with cell, a small spot in cell. Band of hindwing bright red on upperside, not shaded with buff; on underside spots R²—M² well separate from cell.

Hab. South Mexico to Costa Rica.

In the Tring Museum 5 ♂♂, 4 ♀♀, from: Coatzacoalcos, S. Mexico, July 1904 (A. Hall); Volcan de Miravalles, Costa Rica (Underwood); Juan Vinas, 2500 ft., and Carrillo, 3000 ft., Costa Rica, October 1904 (A. Hall).

b. P. sesostris tarquinus Boisd. (1836).

Papilio tarquinus Boisduval, *Spec. Gén. Lép.* i. p. 296. n. 127 (1836) (♀, Colombia); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 47. n. 234 (1852) (Colombia); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 62. n. 247 (1856) (Colombia); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 358 (1861); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 292. n. 40 (1864) (Bogota); Oberth., *Et. d'Ent.* iv. p. 88. n. 280 (1880) (Colombia; Panama; *partim*, ♂ excepted); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 191. n. 2 (1890) (Panama; Bugaba, Chiriqui, Lion Hill).

Papilio sesostris local var. *zestos*, Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 355 (1861) (*partim*; N. Granada).

Papilio sesostris var. *b. P. tarquinus*, Kirby, *Cat. Diurn. Lep.* p. 525. sub n. 60 (1871) (N. Granada).

Papilio sesostris, Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 292. n. 38 (1864) (*partim*; N. Granada; Ecuador); Hopffer, *Stett. Ent. Zeit.* xl. p. 50. n. 9 (1879) (*partim*; N. Granada); Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 126. n. 230 (1880) (Sta. Marta); Hahnel, *Iris* iii. p. 147 (1890) (San Estéban); id., *l.c.* p. 194 (1890) (Mérida); id., *l.c.* p. 203 (1890) (Valera); Haensch, *Berl. Ent. Zeitschr.* xlviii. p. 154 (1903) (Archidona, 640 m.).

Papilio sesostris var. ♂ *zestos*, Oberthür, *Et. d'Ent.* iv. p. 90, sub n. 281 (1880) (*partim*; N. Granada).
Papilio zestos, Staudinger, *Erot. Tagf.* p. 13 (1884) (*partim*; Colombia).

♂. Most specimens with red spot on upperside of hindwing; band R³—(SM¹) on underside more oblique than in the preceding, the posterior one of these three spots being more distal and the anterior a little more proximal than the central one; spot on abdominal fold often small or absent.

♀. Patch M¹—M² of forewing on the whole longer than in the preceding; band of hindwing a little nearer the cell, more oblique, the distal marginal area therefore wider, which is especially noticeable on underside.

Hab. Panama; Colombia; Ecuador; North Venezuela.

In the Tring Museum 30 ♂♂, 15 ♀♀, from: Boquete, Chiriqui, 3500 ft. (Watson); Brava I., Sevilla I., and Parida I., January 1902 (J. A. Batty); Colon, Rio Dagua, West Coast of Colombia (Rosenberg); Onaca, Sta. Marta, 2200 ft., September—October 1901 (Chas. Engelke); Cananche, Cundinamarca, July 1903 (Mathan); Villavicencio to R. Ocoor, Colombia, January 1897 (Dr. Bürger); Cachabi, West Ecuador, November 1896 and January 1897 (Rosenberg); Cachabi to Paramba, February 1897 (Rosenberg).

c. *P. sesostris sesostris* Cram. (1779).

Seba, *Thesaur.* iv. p. 32. t. 26. fig. 19. 20. ♂ (1764).

♂. *Papilio Eques Trojanus sesostris* Cramer, *l.c.* (Surinam); Jabl. & Herbst, *Naturs. Schmett.* ii. p. 70. n. 21. t. 10. fig. 1. ♂ (1784); Esper, *Aust. Schmett.* p. 51. o. 20. t. 12. fig. 2 (1788).

♀. *Papilio Eques Trojanus tullus* Cramer, *l.c.* (Surinam); Esper, *Aust. Schmett.* p. 52. n. 21. t. 12. fig. 3 (1788) (artefact); forewing of *tullus* Cram. and hindwing of *lysauder* Cram.).

Papilio Eques Trojanus aeneus €, *Papilio sesostris*, Gmelin, *Syst. Nat.* i. 5. p. 2233. sub n. 16 (1790).
Prianiades tullus, Hübner, *Verz. bek. Schmett.* p. 87. n. 901 (1818?)

Parides sesostris (!), id., *l.c.* n. 912 (1818?).

Papilio tullus, Godart, *Enc. Méth.* ix. p. 37. n. 37 (1819) (Guyane); Boisd., *Spec. Gén. Léop.* i. p. 295. n. 126 (1836) (Cayenne; Surinam); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 12 (1845) (Brazil); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 201 (1846) (*partim*); Hewitts., *Trans. Ent. Soc. Lond.* (2). i. p. 97 (1851) (♀ of *sesostris*); Doubl., Westw. & Hew., *l.c.* ii. p. 529 (1852) (♀ of *sesostris*).

Papilio sesostris, Godart, *l.c.* ix. p. 38. n. 40 (1819) (Guyane); Lucas, *Léop. Exot.* p. 28. t. 14. fig. 1. ♂ (1835) (Guyane); Boisd., *Spec. Gén. Léop.* i. p. 299. o. 131 (1836) (Surinam; Cayenne); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 13 (1845) (Brazil); Erichs., in Schomb., *F. F. Brit. Guiana* p. 593 (1848) (♀ = *tullus* Cram.); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 19. n. 213 (1847); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 58. n. 267 (1852) (*partim*; Brazil); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Amazons; forest); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 69. n. 282 (1856) (*partim*); Ménétr., *Enum. Corp. Anim. Mus. Petrop., Léop.* i. p. 5. n. 84 (1857) (Brazil); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 339, 355 (1861) (Pará to Tabatinga); id., *Journ. Entom.* I. p. 225. n. 11 (1862) (throughout the Amazons, in the forest); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 292. n. 38. (1864) (*partim*; Surinam; Cayenne; Guyana; Amazonia); Bates, *Natural Riv. Amaz.* p. 25. (1864) (Pará, ♂ in swampy shades, ♀ in more open places); Kirby, *Cat. Diurn. Lep.* p. 525. n. 60 (1871); Druce, *Proc. Zool. Soc. Lond.* p. 244. n. 1 (1876) (Peru); Mösebl., *Verh. Zool. Bot. Ges. Wien* xxvii. p. 295 (1876) (Surinam); Hopff., *Stett. Ent. Zeit.* xl. p. 50. n. 9 (1879) (*partim*; Surinam; Peru; Brazil); Oberth., *Et. d'Ent.* iv. p. 90. n. 281 (1880) (Guyane; Pará; Amazons); Staud., *Erot. Tagf.* p. 13. t. 8. ♂♀ (1884) (Amazons); Sbarpe, *Proc. Zool. Soc. Lond.* p. 555. n. 2 (1890) (Prov. of Goyaz); Hahnel, *Iris* iii. p. 240 (1890) (Villabella, Amaz.); id., *l.c.* p. 253 (1890) (Man⁶⁸); Haase,

- Untersuch. Mimicry* i. p. 79 (1893); Michael, *Iris* vii. p. 213 (1894) (Sao Paulo de Olivença); Weeks, *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumani).
Principes dominans sesostris, Hübner, *Samml. Exot. Schmett.* i. t. 128. ♂. (1806—?) (hab.?; "♀" false).
Papilio cutora Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 58. n. 266. t. 5. fig. 2. ♀ (1852) (*partim*; non ♂).
Papilio lycomes id., *l.c.* p. 52. n. 251 (1852) (nom. nov. pro Esper. t. 12. fig. 3;—artefact); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 66. n. 266 (1856).
Papilio sesostris var. ♂ *zestos*, Oberthür, *Et. d'Ent.* iv. p. 90. sub n. 281 (1880) (*partim*; Amazonas).
Endopogon sesostris, Kirby, in Allen's *Nat. Libr., Lep. Butt.* ii. p. 270 (1896); id., in Hübner, *Samml. Exot. Schmett.* ed. ii. p. 88. t. 128. fig. 3, 4. (190—?).

♂. Usually no red spot on upperside of hindwing; spots of underside rather more distal than in the previons, in Bolivian specimens sometimes minute.

♀. Two patches M^1 — SM^2 on forewing, remote from cell.—One of our two females from East Bolivia (Santa Cruz de la Sierra) has only two small spots on upperside of hindwing, bearing on underside an additional dot R^1 — R^2 ; the spots of upper- and underside of hindwing are pink in both specimens.

Hab. Orinoco; the Guianas; Pará to Peru; Bolivia; Goyaz.

In the Tring Museum 76 ♂♂, 20 ♀♀, from: Snapure, Caura R., Orinoco, Oct. 1902 (S. M. Klages); British Guiana; Surinam; Santarem; Obidos; R. Jurua, June 1897 (Dr. Bach); Iquitos (Stuart); R. Ucayali and R. Caehyaco (Stuart); R. Mixiollo, Loreto (Baer); Pozuzo, Huánuco (Hoffmanns); Chanchamayo (Schunke); R. Chuchuras, Huánuco (Hoffmanns); La Union, Carabaya, 2000 ft., Nov. 1904 (Oeckenden); Salinas, Bolivia, July 1895, and Reyes, August 1895 (Stuart); Mapiri; Province Sara, S. Cruz de la Sierra (Steinbach).

24. *Papilio childrenae* Gray (1832).

♂. *Papilio childrenae* Gray, in Griff., *Anim. Kingd.* xv. p. 673. t. 38. fig. 1 (1832) ("Brazil," error loci).

♀. *Papilio childrenae*, Felder, *Wien. Ent. Mon.* v. p. 73. n. 6 (1861) (Bogota).

♂ ♀. Close to *P. sesostris*.—In male, green area of forewing much larger, entering cell, occupying from one-third to two-thirds of the cell, one or more white spots beyond apex of cell, either on both sides, or only below, or the spots absent; red spot of hindwing always present, oblique, contiguous with cell, expanded at cell from before M^1 to M^2 , the red scaling before M^1 being restricted to the very base of the cellule. On *underside* of hindwing there is a row of spots from SC^2 to anal angle, but the upper spots, which are small, are always shaded with black, being in most specimens absent; spot R^3 — M^2 larger than the others, spot M^1 — M^2 often the only one preserved, besides a more or less linear spot M^2 — SM^2 , which is often interrupted.—In female, two buffish white patches M^1 — SM^2 on forewing, separate from cell, the first sometimes minute, the second always large, often a minute spot behind SM^2 and another before M^1 ; several spots beyond apex of cell, but no spot in cell; hindwing resembling that of *P. sesostris*.

Scent-organ as in *P. sesostris*.

Genitalia as in *P. sesostris*; harpe more curved, dentition at apex a little more ventral, the solitary ventral tooth larger.

Early stages not known.

Hab. Guatemala to Ecuador.

Two subspecies.

a. *P. childrenae childrenae* Gray (1832).

Papilio childrenae Gray, *l.c.* (1832); Staud., *Exot. Tagf.* p. 13 (1884) (Central America); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 192. n. 3. t. 65. fig. 1. ♂, 2. ♀, 3. genit. (1890) (Guatemala; Nicaragua; Costa Rica; Panama); Haase, *Untersuch. Mimicry* i. p. 79 (1893).

Papilio sesostris var., Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 58. sub n. 267 (1852) (Brazil); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 70. sub n. 282 (1852) (Brazil).

♂. Forewing always with a rather large white spot, which is usually preceded by a smaller one.

♀. Band of hindwing on the whole brighter red than in *P. ch. childrenae*.

Hab. Panama to Guatemala.

In the Tring Museum 74 ♂♂, 8 ♀♀, from: Carillo, Costa Rica, June—July 1903 (Underwood); Carillo, 3000 ft., Oct. 1904 (A. Hall); Chiriqui; Colon.

b. *P. childrenae oedippus* Lucas (1857).

♂. *Papilio oedippus* (!) Lucas, in Casteln., *Voy. Amer. Sul, Ent.* p. 197 (1857) ("Inter. of Brazil"); Stand., *Exot. Tagf.* p. 13 (1884) (Colombia); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 192. sub n. 3 (1890); Skinn., *Ent. News* xv. t. 1, fig. 3. ♂ (1904).

Papilio oedippus (!) Lucas, *l.c. Léop.* t. 2, fig. 4. ♂ (1857).

Papilio sesostris, local var. *childrenae*, Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 355 (1861) (New Granada).

Papilio childrenae, Felder, *Wien. Ent. Mon.* v. p. 73. n. 6 (1861); id., *Verh. Zool. Bot. Ges. Wien* xiv. p. 292. n. 41 (1864) (Bogota; R. Napo; Interior of Brazil); id., *Reise Novara, Lep.* p. 21. n. 11 (1865) (Bogota); Kirby, *Cat. Diurn. Lep.* p. 525. n. 60a (1871) (N. Granada; Ecuador); Oberth., *Et. d'Ent.* iv. p. 90. n. 282 (1880) (N. Granada).

Papilio oedippus, Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 292. sub n. 41 (1864).

♂. No white spot on upperside of forewing, or (rarely) only one small dot* Underside of hindwing mostly without red spots SC²—R².

♀. Band of hindwing pale, somewhat buffish proximally on upperside.

Hab. Colombia and Ecuador.

An Ecuador specimen (♂) in coll. Hewitson (British Museum) has a small red spot on upperside of hindwing and two small spots R³—M² on underside; the green scaling in cell of forewing is much reduced in extent.

In the Tring Museum 40 ♂♂, 7 ♀♀, from: Rio Dagua, W. Colombia (Rosenberg); "Bogota."

25. *Papilio erlaces* Gray (1852).

♂. *Papilio erlaces* Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 49. n. 240. t. 8. fig. 9. ♂ (1852) (♂ only ♀ another species; Bolivia).

♀. *Papilio cyphotes* id., *l.c.* p. 49. n. 241 (1852) ("S. America, coll. Hewitson").

Palpus always black in both sexes. Fringe of both wings dotted with white.

♂. Tibiae spinose, not incrassate, resembling those of female. Eighth abdominal segment edged with red ventrally in front of clasper. Forewing: a large olivaceous green patch from inner margin forward, sometimes entering cell, the scales composing it elongate, tongue-shaped; a creamy white spot M¹—M², usually large, very often preceded by a smaller spot R³—M¹, occasionally followed by a small dot standing behind M², these spots wanting in nearly all Ecuadorian specimens and in a small proportion of the individuals from Peru and Bolivia.—Hindwing: three red spots R²—M¹, about half-way between cell and distal margin, strongly opalescent, the first spot sometimes minute, occasionally absent, rarely a fourth dot R¹—R² marked; on underside the spots much paler, in the northern forms more or less creamy, the row being usually prolonged forward by one or two spots, there being also two spots present on the abdominal fold.

♀. Ventral edge of seventh abdominal segment and apex of eighth red.—Forewing with large white patch, consisting of two or three discal spots and a large cell-spot, there being often some small dots distally of apex of cell.—Hindwing : a band of red spots, distant from cell, rarely touching cell at R³.

Neuration : cell of hindwing acuminate, D³ being transverse and shorter than D⁴, usually much shorter.

Scent-organ with white wool.

Genitalia : ♂. Tenth tergite about one-third longer than the sternite, lateral edge at base sharp, somewhat projecting, irregularly sinuous, minutely denticulate like the edge of the ninth tergite. Harpe of almost even width from base to apex, somewhat curved dorsad, its dorsal edge being concave, apex rounded dorsally ; a large tooth at ventral margin in or beyond middle ; from this tooth to apex a number of smaller conical teeth.—♀. In front of vaginal orifice a long lobe, of nearly even width, feebly sinuate at apex ; on each side but more proximally another lobe, rounded at apex, the internal edges of these lateral lobes extending on to the proximal surface of the median lobe ; behind the vaginal orifice a large rounded lobe covering the vaginal cavity. Anal segment with numerous short, stout, club-shaped or pointed bristles.

Early stages not known.

Hab. Ecuador to North Argentina.

No representative known from the Amazons, Brazil, the Guianas, Venezuela, and Colombia.

a. P. erlaces lacydes Hew. (1869).

♂. *Papilio lacydes* Hewitson, *Equat. Lep.* i. p. 1. n. 1. (1869) (Ecuador) ; Kirby, *Cat. Diurn. Lep.* p. 527. n. 62c (1871) ; Maas. & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 64. n. 89 (1890) (Huamboya).

♀. *Papilio erithalion* ♀ ab. ? *equestris* Oberthür, *Et. d'Ent.* iv. p. 88. sub n. 276. t. 5. fig. 2 (1880) ("Quito").

♂. *Papilio erithalion* var. *lacydes* Oberthür, *l.c.* p. 116. n. 276 (1880) (Ecuador).

♂ ♀. *Papilio lacydes*, Kirby, *Trans. Ent. Soc. Lond.* p. 351 (1881) (descr. of ♂ ; Sarayaçu ; Chiquinda) ; Grose-Smith & Kirby, *Rhop. Esot.* ii. p. 39. n. 26. *Pap.* t. 16. fig. 1, 2. ♂ (1897) (Sta. Ines ; Sarayaçu ; Chiquinda).

Papilio erithalion var. *equestris*, Maassen & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 64. sub n. 88 (1890) (Huamboya).

♂. Forewing rarely with a white spot. Spots of hindwing below small, creamy white, partly pinkish.

♀. Forewing : white cell-patch large, reaching across cell, there being always a triangular streak in front of cell, most specimens with some small spots distally of apex of cell, the cross-veins alone being black ; white spot R²—R³ large, often larger than spot R³—M¹, which is mostly much reduced posteriorly, extending to M¹ only distally ; no spot behind M¹.—Band of hindwing white.

Hab. Eastern Ecuador.

In the Tring Museum, 55 ♂♂, 26 ♀♀, from : Loja ; Zamora, 3000—4000 ft. (O. T. Baron) ; Santa Inez (R. Haensch).

In coll. Oberthür a series from : Ambato ; Sarayaçu ; Baños to Canelos.

b. P. erlaces xanthias subsp. nov. (Pl. V. fig. 24).

♂. *Papilio erlaces*, Druce, *Proc. Zool. Soc. Lond.* p. 245. n. 3 (1876) (Pozuzo).

♂. Not constantly different from : the following ; forewing nearly always with one or two white spots, there being sometimes a minute third spot behind M².

Spots on underside of hindwing either cream-colour as in *lacydes*, or red as in *erlaces*, or intermediate.

♀. Forewing: two white spots R^2-M^1 , the second much the largest, its posterior proximal corner cut off; cell-spot more or less triangular, just reaching across cell, rarely a small streak in front of cell.—Hindwing: band yellowish cream-colour, broader than in *lacydes*, spot C— SC^2 small or absent.

Hab. North-East Peru, southward to Huánuco. Type of name: ♀ from Pozuzo.

In the Tring Museum, 21 ♂♂, 5 ♀♀, from: Pozuzo, 800—1000 m. (W. Hoffmanns); Cushi, 1820 m. (W. Hoffmanns).

In coll. Oberthür a series of males from Chachapoyas and Moyobamba.

c. P. erlaces erlaces Gray (1852).

♂. *Papilio erlaces* Gray, *l.c.* (1852) (Bolivia); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 63. n. 253 (1856) (*partim*); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 341, 356. n. 8 (1861) (Bolivia; Eastern Peru); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 293. n. 46 (1864) (Bolivia; Peru); Kirby, *Cat. Diurn. Lep.* p. 528. n. 62g (1871) (Bolivia); Hopff., *Stett. Ent. Zeit.* xl. p. 49. n. 5 (1879) (= *luctuosa*; Bolivia; Chanchamayo; descr. of ♀); Weeks, *Illustr. Diurn. Lep.* p. 28 (1905) (Bolivia: Cochabamba).

♀. *Papilio hierocles*, Bates, *l.c.* p. 341 (1861) (*partim*).

♀. *Papilio cyphotes* Gray, *l.c.* p. 49. n. 241 (1852) ("S. America"); Kirby, *l.c.* p. 527. n. 60 d (1871) (*partim*).

♂. *Papilio luctuosa* Butler, *Cist. Ent.* i. p. 12 (1869) (Peru); Kirby, *Cat. Diurn. Lep.* p. 527. n. 62 b (1871).

♂. White spots of forewing very variable in size, rarely absent. On underside of hindwing from five to seven red spots, the central ones the largest and more or less extended pinkish white.

♀. Forewing: most specimens with three white spots behind cell, there being a streak behind M^1 in addition to spots R^2-M^1 ; spot R^2-R^3 sometimes minute; cell-spot very variable, in most individuals triangular, not reaching across cell, in some specimens as large as in *lacydes*, there being in this case a prominent streak in front of cell; some individuals with minute spot before R^2 .—Hindwing: band red, on the whole paler and spots R^2-M^2 longer in the specimens from East Central Peru than in those from South-East Peru and Bolivia; the band consisting usually of seven spots, the last of which are more or less merged together, the upper two being occasionally absent.

Hab. Peru to North Argentina, from the Rio Peréné (Chanchamayo) southward to Tucuman.

One of the Chanchamayo females which we have seen has the band of the hindwing orange-red (coll. Charles Oberthür), being a transition to *xanthias*.

In the Tring Museum, 70 ♂♂, 23 ♀♀, from: Chanchamayo (W. Hoffmanns); R. Toro, Chanchamayo, August—September 1901 (Simons); R. Peréné, March 1900 (Simons); R. Slacuri, S.E. Peru, June 1901 (Simons); various places in Carabaya, S.E. Peru, apparently all through the year (G. Ockenden); Vilcanota, Cuzco, 3000 m. (Garlepp; from Staud. & Bang-Haas, altitnde correct ??); Cajon, Cuzco (Garlepp); Huancabamba, N.E. of Cerro de Pasco (Boettger); R. Cachyaco, affluent of R. Huallaga (Stuart); Marcapata; Mapiri; Yungas de la Paz; R. Burmejo to R. Pilcomayo, Bolivia, December 1903, and Province Sara, S. Cruz de la Sierra (J. Steinbach); R. Grande, Province Cordillera, December 1903 (J. Steinbach); Tucuman (G. A. Baer).

26. *Papilio burchellanus* Westw. (1872). (Pl. IV. fig. 1).

♀. *Papilio burchellanus* Westwood, *Trans. Ent. Soc. Lond.* p. 101. t. 3. fig. 5 (1872) (Tenente, Farinhapodre, Brazil); Kirby, *Cat. Diurn. Lep.* p. 812. n. 351 (1877).

♂. *Papilio socama* Schaus, *Proc. U.S. Nat. Mus.* xxiv. p. 424 (1902) ("Bolivia").

♂ ♀. Palps black. Mid- and hindtibiae of male slightly incrassate and hairy, foretibia spinose. Forewing without markings, except the more or less distinct white fringe-spots.—Hindwing with a row of widely separate rounded spots nearer margin than cell, almost parallel to margin, the spots rather smaller and paler beneath.

Scent-organ: a streak of buffish white wool in fold, the streak narrower than in *P. vertumnus*.

Genitalia: ♂. Harpe long, straight, reaching to apical margin of clasper, and bearing at the apex about half a dozen teeth; no tooth in middle of ventral margin.

Hab. Interior of Brazil. The occurrence in Bolivia requires confirmation; Mr. Schaus did not receive the specimen described by him direct from Bolivia, but from a correspondent who has been a resident of Rio de Janeiro. The species is very interesting, being an exact counterpart of *P. panthonus numa*, which also occurs in Brazil.

In coll. Charles Oberthür one male from Goyaz.

27. *Papilio drucei* Butl. (1874).

♀. *Papilio eutora*, Bates (*non* Gray, 1852, *err. det.*), *Trans. Ent. Soc. Lond.* (2), v. p. 341, 355 (1861) (♀ only; Ega).

♂. *Papilio drucei* Butler, *Trans. Ent. Soc. Lond.* p. 434. t. 6. fig. 2. ♂ (1874) (Ecuador); Kirby, *Cat. Diurn. Lep.* p. 812. n. 357 (1877); Oberth., *Et. d'Ent.* iv. p. 116. n. 276^{bis} (1880) (Pebas. ♀ = *opalinus*); Kirby, *Trans. Ent. Soc. Lond.* p. 353 (1881) (Canelos, ♂); Michael, *Iris* vii. p. 214 (1894) (Sao Paulo de Olivença).

♀. *Papilio opalinus* Butler, *Trans. Ent. Soc. Lond.* p. 145. n. 225. t. 3. fig. 5 (1877) (Rio Purus).

♂. Palpus black, rarely red. Eighth abdominal segment edged with red beneath. Tibiae and first tarsal segment hairy above, very slightly incrassate. Forewing: a sage-green patch from inner margin to M¹ or R³, separated from cell, often reduced to a narrow band; fringe dotted with white; sometimes two small creamy white spots M¹—(SM¹), on underside occasionally four spots.—Hindwing: three opalescent red spots R²—M² close to cell, often preceded by a dot or streak R¹—R² and followed by a narrow streak M²—(SM¹).

♀. Palpus black or red. Apex of eighth abdominal segment and of seventh sternite red. Forewing without white patch; fringe dotted with white. Band of hindwing red, sometimes rather strongly opalescent, the red scales being in this case nearly all entire, while the red non-opalescent scales are obtusely bidentate; the number of spots varying from five to seven, their size being also variable, the band not touching cell, but standing sometimes close to it; last two spots usually merged together.

Nervation, scent-organ and genitalia essentially as in *P. lucydes*; in female the postvaginal plate more triangular, the incrassate edge being mesially dilated into a rather prominent tubercle which is a little curved backwards.

Early stages not known.

Hab. Ecuador to Bolivia, Upper Amazons.

In the Tring Museum 12 ♂♂, 15 ♀♀, from: Archidona (R. Haensch); Cooca, Upper Rio Napo, May—July 1899 (W. Goodfellow); Zamora (O. T. Baron); Juluty, Amazons, April 1905 (Mathan); R. Jurna; Iquitos; R. Cachyaco, affluent

of R. Huallaga (Stuart); Pozuzo, Huánuco (W. Hoffmanns); R. Chuechuras (W. Hoffmanns); Pachitea; Cuzco; Mapiri, Bolivia.

In coll. Oberthür a series of both sexes from: Tarapoto; Cavallo Cocho; Sarayaçu; Pebas.

28. *Papilio cutorina* Stand. (1898).

♂. *Papilio vertumnus* local var. *cutorina*, Bates (*non* Gray, 1852, err. det.), *Trans. Ent. Soc. Lond.* (2). v. p. 341, 355 (1861) (*partim*; ♂ only).

♂. *Papilio cutorina*, Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 292, n. 43 (1864) (*partim*); Druce, *Proc. Zool. Soc. Lond.* p. 245, n. 2 (1876) (Ucayali and Huallaga); Kirby, *Trans. Ent. Soc. p.* 353 (1881) (Ecuador, common!—this insect??); Hahnel, *Iris* iii. p. 275 (1890) (Sao Paulo de Olivença); Michael, *Iris* vii. p. 214 (1894) (Sao Paulo de Olivença).

Papilio vertumnus var. g. *P. cutorina*, Kirby, *Cat. Diurn. Lep.* p. 525, sub n. 61 (1871) (Upper Amazons).

♂♀. *Papilio cutorina* Staudinger, *Iris* xi. p. 139 (1898) (Sao Paulo de Olivença; Pebas; Iquitos); id., *l.c.* p. 376 (1899) (*mazepa* is ♀ of *cutorina*); Grose-Smith, *Rhop. Exot.* iii. p. 51, n. 37. *Pap.* t. 22, fig. 1, 2, ♂ (1902).

♀. *Papilio mazepa* Grose-Smith, *l.c.* p. 42, n. 29. *Pap.* t. 17, fig. 3 (1899) (Iquitos).

Palpus red. Fringe of forewing spotted. Cell of hindwing narrow at apex, D³ being transverse and short.

♂. Tibiae spinose, not incrassate. Eighth abdominal segment edged with red ventrally. Glauous green patch of forewing from inner margin to M² or a little beyond, proportionally longer than in *P. vertumnus* in basi-distal direction. Only two red spots on upperside of hindwing situated between M¹ and (SM¹). Spots on underside of hindwing cream-colour, somewhat glauous buff at edges, resembling the spots of *P. aeneas bolivar*.

♀. Forewing without white patches. Hindwing with creamy band consisting usually of five contiguous spots.

Nenration, scent-organ and genitalia essentially as in *P. vertumnus*.

Early stages not known.

Hab. Upper Amazons, East Peru, and East Ecuador.

In the Tring Museum: 3 ♂♂, 3 ♀♀, from: Coca, R. Napo, Ecuador (R. Haensch); Rio Chuechuras, Huánuco (W. Hoffmanns); R. Cachyaco, affluent of R. Huallaga (Stuart); Sao Paulo de Olivença; Itaituba; Pebas.

In coll. Oberthür: 2 ♂♂, 7 ♀♀ from Iquitos and Sao Paulo de Olivença.

29. *Papilio phosphorus* Bates (1861) (Pl. IV. fig. 9. 10. 11).

♂. *Papilio phosphorus* Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 342 note (1866) (R. Demerara).

♀. *Papilio gratianus* Hewitson, *Exot. Butt.* ii. *Pap.* t. 5, fig. 13 (1861) (New Granada; "♂" false).

Having received a female agreeing almost in every detail with Hewitson's type (which is a female with a male abdomen stuck on), we have no longer any doubt that *phosphorus* and *gratianus* are the sexes of the same species.

♂. Tibiae spinose, not incrassate. Palpus red. *Upperside*: forewing semi-transparent in apical area; a glauous or buffish green patch from hinder margin forward to M¹ or beyond; one or two white spots behind M², often a third before M², minute or large, usually elongate, often absent.—Hindwing rather strongly dentate; a row of three, four, or five spots, gradually decreasing in size from M² forward, the last two more or less contiguous, the others separate, distance of spot R³—M¹ from cell at least equal to half the length of the spot.

Underside: forewing always (?) with at least one minute white dash behind or before M², usually with two spots, often three, two of which stand between M² and

SM².—Hindwing with six or seven spots, the row in middle about halfway between cell and distal margin, spot behind M² beyond middle of this vein.

♀. This is the only instance in which the female bears on the forewing a patch somewhat similar to that of the male.—*Upperside*: forewing with slaty grey patch from inner margin to M² or beyond, the patch narrower than in male, consisting of buffish white, narrow, entire scales lying on black ones; three or four white spots within the patch, two standing between M² and SM².—*Hindwing*: a pale red band from abdominal margin forward, gradually decreasing in width from M², curved, situated about halfway between cell and distal margin, the posterior spots contiguous, the anterior ones separate.

Underside: white spots of forewing as above, but no slaty scaling.—*Hindwing*: band narrower than above, the spots all or nearly all separate.

Genitalia: ♂. Harpe shorter than in the allied forms, the apical half more acuminate-triangular, ventral tooth large.

Hab. British Guiana; Colombia; Eastern Peru; Lower Amazons.

May be expected to occur also on the Middle and Upper Amazons.

a. P. phosphorus phosphorus Bates (1861) (Pl. IV. fig. 9. ♂. type, 10. ♀).

♂. *Papilio phosphorus* Bates, *l.c.* (Rio Demerara); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 293. n. 47 (1864); Kirby, *Cat. Diurn. Lep.* p. 528. n. 62e (1871).

♂. *Upperside*: forewing, a patch from inner margin to M¹, being in that direction much longer than it is broad, distant from cell, with two or three minute white linear spots, or one, or no spot.—*Hindwing* with an evenly curved row of four or five spots.

Underside: on forewing at least one minute white spot.

♀. *Upperside*: forewing with a row of four white spots; spot M¹—M² much larger than in Hewitson's figure.—Band of hindwing consisting of six spots, the first minute, the last four much smaller than in Hewitson's specimen.

Hab. British Guiana; Lower Amazons.

In the Tring Museum: 6 ♂♂, 1 ♀, from: British Guiana (R. Haensch); British Guiana; Igarapé, Pará (W. Hoffmanns).

b. P. phosphorus gratianus Hew. (1861) (Pl. IV. fig. 11).

♀. *Papilio gratianus* Hewitson, *l.c.* (New Granada); Felder, *l.c.* p. 295. n. 82 (1864); Kirby, *l.c.* p. 528. n. 65 (1871).

♂. *Upperside*: forewing, green patch much broader than in the preceding, touching cell or nearly; with or without white spots.—*Hindwing*: three red spots R²—M² and sometimes a minute dot R¹—R², the row less curved than in the previous subspecies, the last spot not reaching further proximad than the last but one.

Underside: at least one white dot on forewing.—On hindwing five or six red spots, the spots R³—M² smaller than in *P. ph. phosphorus*.

♀. Forewing with two white spots; last three spots of hindwing very large.

Hab. Colombia (♀); Peru (♂♂).

We have not seen Peruvian females, nor Colombian males, and therefore do not know if there are two races in these countries or one.

In the Tring Museum 3 ♂♂ from Pachitea and Hillapani, Peru (received from Messrs. Standinger and Bang-Haas).

In coll. Oberthür from Tarapoto, Peru.

30. *Papilio vertumnus* Cram. (1779).

♂. *Papilio Eques Trojanus vertumnus* Cramer, *Pap. Exot.* iii. p. 32. t. 211. fig. A, B (1779) (Surinam; fig. C = *P. anchises* ♂).

♀. *Papilio cicuis* Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 48. n. 237. t. 8. fig. 6 (1852) (Ega).

As the tibiae are in a number of species of the present group simply spinose and non-incrassate, resembling the tibiae of the females, while in other species the tibiae are incrassate and densely hairy, bearing only a limited number of spines, it is of great interest to observe that in *P. vertumnus* this specific difference breaks down.

Though the tibiae of *vertumnus* are never much incrassate, they are densely hairy in one geographical form, and almost normally spinose in the other forms.

♂. Palpus red, eighth abdominal sternite edged with red. Forewing with large glaucous green patch from inner margin forward beyond M^2 , sometimes extending a little across M^1 , the streak at inner margin sometimes reduced, seldom absent, the patch variable in width, touching cell at least at base of M^2 , rarely so much reduced as to be 1 or 2 mm. distant from cell.—Red patch of hindwing close to cell, triangular, consisting of three or four spots, the last (rarely the last but one) being the longest, this last spot standing behind M^2 ; the spots small on underside, spot R^3-M^1 being placed about midway between cell and distal margin.

♀. Palpus and apex of eighth abdominal segment and of seventh sternite red. Forewing with white or creamy patch. Red band of hindwing broad, consisting of five to six spots, there being rarely a small seventh spot in front of R^1 , the last four spots more or less completely merged together, the scaling on veins M^1 and M^2 being red, at least proximally, within the red band; the band paler beneath, the veins traversing it black, the last two spots alone confluent, rarely separated like the other spots.

Nenuration: D^3 of hindwing transverse, short, being shorter than D^1 .

Scent-organ: fold with broad streak of white wool; scales at discal side of wool grey, elongate, entire.

Genitalia: ♂. Tenth tergite one-fourth longer than the sternite, its lateral edge dilated basally into a small ridge. Harpe as in *P. lacydes*, apex a little more regularly rounded.—♀. As in *P. erlaces*, but antevaginal lateral ridge membranaceous, wrinkled, not raised to a distant lobe; edge of postvaginal plate tuberculiform in middle.

Early stages not known.

Hab. Eastern slopes of the Andes from Colombia to Bolivia, extending eastwards to Pará and the Guianas; not yet found in Venezuela.

a. P. vertumnus juracares subsp. nov.

♂. Green patch of forewing touching cell between M^1 and M^2 , its proximal edge between M^2 and inner margin slightly oblique, somewhat concave, the patch narrower in basi-distal direction than across veins; a white spot M^1-M^2 , rounded, in one specimen reaching from M^1 to M^2 , a minute dot behind it in two of our three individuals; these white spots repeated on undersurface.—Hindwing with four red spots, the upper two separate, the second rounded off proximally and distally; five small pale red spots on underside.

♀ not known.

Hab. Eastern Bolivia.

In the Tring Museum 3 ♂♂, from: Encorado, January 1904, and Province Sara, S. Cruz de la Sierra, March—April 1904 (J. Steinbach); Mapiri.

b. P. vertumnus autumnus Standl. (1898) (Pl. IV. fig. 3).

♂. *Papilio vertumnus* Cr. var. *autumnus* Standinger, *Iris* xi. p. 142 (1898) (Chanchamayo).

♂. Green patch of forewing larger than in the preceding, usually touching cell also behind M², often extended along cell as far as halfway between M² and base; most specimens with one or two white elongate spots.—Hindwing: red patch consisting of three spots, large, the third spot reaching close to base of M², sometimes extending a short distance along cell; four small red spots on underside, sometimes a minute fifth before R³, spot M¹—M² often obsolete.

♀. Very different from the well-known females from the Amazons and Guiana. Forewing: patch cream-colour, very large, consisting of four spots; a very large cell-spot, occupying about half the cell, proximally edged with glaucous buff, a small spot before R³, a large spot R³—M¹, truncate, and another large spot M¹—M², as long as the one before it, but not so broad, not quite extended to M².—Hindwing: red band broad, consisting of six spots, one specimen bearing a minute seventh spot before R¹; on underside some of the spots shaded with black proximally.

Hab. Central East Peru: Chanchamayo district, probably also farther south.

In the Tring Museum: 26 ♂♂, 4 ♀♀, from: Chanchamayo (W. Hoffmanns; Schunke); R. Toro, August—September 1901, and R. Peréné, March 1900 (Simons).

c. P. vertumnus bogotanus Feld. (1864).

♂. *Papilio vertumnus* var. *bogotanus* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 292, sub n. 42 (1864) (Bogota); Maass & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 31, n. 127 (1890) (Colombia).

♂. Connecting the preceding subspecies with the following. Green patch of forewing contiguous with cell between M¹ and M²; no white spot.—Red patch of hindwing large, consisting sometimes of four spots; the spots small on underside as in the preceding form.

Hab. Rio Palcazu and Pachitea in Peru, northward to Bogota, eastern slopes of the Andes.

In the Tring Museum 9 ♂♂ from: Pozuzo, Hnáuco, and Rio Chuchuras, affluent of R. Palcazu (W. Hoffmanns); R. Mixiollo, Loreto (Baer); Pachitea; Rio Caehyaco, affluent of R. Huallaga (Stuart); Archidona (R. Haensch); Bogota.

d. P. vertumnus diceros Gray (1852).

♀. *Papilio diceros* Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 48, n. 236, t. 11, fig. 4 (1852) (Pará); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 63, n. 249 (1856) (Pará); Wall., *Trans. Ent. Soc. Lond.* (2), ii. p. 256 (1854) (Pará; forest).

♀. *Papilio cicinus* Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 48, n. 237, t. 8, fig. 6 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 63, n. 250 (1856) (Ega; vars. from R. Tapajos and Villa Nova); Wall., *Trans. Ent. Soc. Lond.* (2), ii. p. 256 (1854) (Upper Amazons; forest).

♂. *Papilio vertumnus*, Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 57, n. 266 (1852); Wall., *Trans. Ent. Soc. Lond.* (2), ii. p. 255 (1854) (Pará; forest); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 69, n. 281 (1856) (*partim*; Pará); Ménétr., *Enum. Corp. Anim. Mus. Petrop., Lép.* i. p. 5, n. 78 (1857) ("Brazil").

♂. *Papilio vertumnus* var. *c. Papilio eulora* Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 58, sub n. 266, t. 10, fig. 6, ♂ (1852) (♂ only; ♀ alia spec.); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 69, sub n. 281 (1856) (Ega; Villa Nova; "Brazil"); Bates, *Trans. Ent. Soc. Lond.* (2), v.

p. 340, 355 (1861) (syn. *partim*); id., *Journ. Entom.* i. p. 225. n. 12 (1862) (*partim*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 292. n. 42 (1864) (*partim*; Amazons); Bates, *Natural. Riv. Amaz.* p. 26 (1864) (Pará, ♂ in swampy shades, ♀ in more open places); Butler, *Cat. Diura. Lep. descr. Fabric.* p. 235. n. 6 (1869) (Pará); Oberth., *Et. d'Ent.* iv. p. 83. n. 274 (1880) (Pará); Obydos); Staud., *Exot. Tayf.* p. 13 (1881) (*partim*; Amazons); Hahnel, *Iris* iii. p. 212 (1890) (Pará); id., *l.c.* p. 240 (1890) (Villa Bella, Amaz.); Michael, *Iris* vii. p. 213 (1894) (Sao Paulo de Olivença).

Papilio vertumnus var., Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 58. sub n. 266 (1852) (Pará); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 69. sub n. 281 (1856) (Pará).

Papilio cutora, Wallace, *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Amazons; forest); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 292. n. 43 (1864) (*partim*).

♂. Green patch touching cell between M^1 and M^2 , often a little separated from cell, in many specimens not reaching M^1 ; white spots transverse, oblique, usually absent.—Red patch of hindwing smaller than in the preceding forms, especially the last spot; spots of underside usually larger than in the previous forms.

♀. Forewing with chalky-white patch, consisting of two, three or four spots, most specimens having a small spot in cell, a large spot R^3-M^1 , a small one before R^3 and a streak behind M^1 . A specimen from S. Paulo de Olivença, in coll. Oberthür, has only a small double spot, divided by vein M^1 , extending forward and backward only to the middle of the cellules. Gray figures as *civius* a female with a single, square spot R^3-M^1 . The only specimen which we have seen of this form, besides the type, came from Surinam. Gray's specimen was said to be from Ega. It was bought from Stevens, the locality being perhaps erroneous.

Hab. Amazons: from Para to Iquitos.

In the Tring Museum 14 ♂♂, 16 ♀♀, from: Sao Paulo de Olivença; Juhuty, April 1905, and Obidos, October—November 1904 (Mathan); Itaituba; Manicoré.

e. P. vertumnus vertumnus Cram. (1779).

Papilio Eques Trojannus vertumnus Cramer, *l.c.*; Jabl. & Herbst, *Naturs. Schmett.* ii. p. 61. n. 20. t. 11. fig. B (1784); Esper, *Ausl. Schmett.* p. 58. n. 25. t. 15. fig. 1 (1788); Fabr., *Ent. Syst.* iii. 1. p. 16. n. 49 (1793) (Surinam).

Papilio Eques Romanus vertumnus, Jablonsky & Herbst, *Naturs. Schmett.* ii. p. 64 (1784).

Papilio Eques Trojannus aeneas, Fabricius, *Spec. Ins.* ii. p. 8. n. 32 (1781) (*partim*); Gmelin, *Syst. Nat.* i. 5. p. 2233. n. 16 (1790) (*partim*).

Parides vertumnus, Hübner, *Verz. bek. Schmett.* p. 87. n. 911 (1818?).

Papilio vertumnus, Godart, *Enc. Méth.* ix. p. 37. n. 38 (1819) (*partim*); Boisd., *Spec. Gén. Lép.* i. p. 298. n. 129 (1836) (Cayenne; Surinam); Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vii. p. 47 (1838); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 200 (1846) (Guiana); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 292. n. 42 (1864) (*partim*; Surinam; Cayenne); Kirby, *Cat. Diurn. Lep.* p. 525. n. 61 (1871) (*partim*); Staud., *Exot. Tayf.* p. 13 (1884) (*partim*; Surinam); Haase, *Untersuch. Mimicry* i. p. 79 (1893).

Papilio vertumnus var., Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 57. sub n. 266 (1852) (Surinam); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 69. sub n. 281 (1856) (Surinam).

Papilio vertumnus var. *diceros*, Möschler, *Verh. Zool. Bot. Ges. Wien* xxxii. p. 303 (1883) (Surinam).

♂. As in the Amazonian form, but the mid- and hindtibiae short-hairy; this character not quite constant.

♀. Forewing with the white patch as in the Amazonian form, or the patch reduced to a single spot R^3-M^1 , which is sometimes vestigial only.

Hab. The Guianas.

In the Tring Museum 6 ♂♂, 4 ♀♀, from: Camaria, British Guiana, January 1904 (R. Haensch); Essequibo R.; Surinam.

A series of both sexes in coll. Oberthür from Maroni, French Guiana.

31. *Papilio lycimenes* Bois. (1870) (Pl. VI. fig. 31. 33. 34).

♂. *Papilio lycimenes* Boisduval, *Consid. Lép. Guatemala* p. 7 (1870) (Costa Rica; synon. excl.).

A near relative of *P. vertumnus*. The ranges of the two species overlap in Colombia. The forewing is shorter and proportionately broader, the green patch of the forewing and the red patch of the hindwing of the male are differently shaped, and the red spots of the underside of the hindwing, instead of being small, as in the Colombian form of *vertumnus*, are large, having also a different position. In the female the wings are less deep black than in *vertumnus*, opaque, the spots of the forewing are yellowish white, the cell-spot is transverse, reaching across the cell, and the band of the hindwing is much paler both above and below. There is hardly anything in structure by which *P. lycimenes* could be distinguished from all forms of *P. vertumnus*.

Besides a subspecies of *P. lycimenes* there are in Colombia three more *Papilios* with almost the same pattern. They occur in the same localities, and are apparently quite distinct from one another, being independent forms—*i.e.* true species. Leaving *P. vertumnus* apart, this insect being easily recognised, there are four species generally mixed up in collections. At first sight one is inclined to take these insects for mere individual varieties of one species, the species resembling each other so much, and each species being in itself so variable, that only by a careful study of long series of specimens are we now enabled to draw the lines of separation. If one has once understood that there are four species in Colombia occurring apparently everywhere together in suitable places (perhaps with the exception of *P. anchises scrapis*, which has not been found in West Colombia), and if one has moreover grasped the distinctions between the species in Colombia, it will be comparatively easy to separate into species also the material from Central America, where the same problem obtains. Therefore we confine our remarks in this place to the Colombian forms of the four insects in question. Three of these insects are common in "Bogota" collections.

The males of the Colombian subspecies of these species are separable by comparing the size of the red patch or band of the hindwing and the structure of the tibiae.

a. Tibiae simply spinose as in female.

a'. Red patch of hindwing large, there being always a streak behind M² A subspecies of *P. lycimenes*.

b'. Hindwing with three small spots, no streak behind M², or only a minute dot A subspecies of *P. erithalion*.

b. Tibiae and first tarsal segments dilated, densely hairy.

c'. Hindwing below with a band of six or seven spots, the band close to apex of cell . . . Two subspecies of *P. anchises*.

d'. Hindwing usually with four or five spots on underside, spot M² (SM¹) much nearer to the distal margin than to the cell A subspecies of *P. iphidamas*.

The females are best distinguished by the different relative size of the spots of the forewing and the colour or width of the band of the hindwing.

e. Spot R³—M¹ smaller than the spot in front of it; cell-patch large A subspecies of *P. erithalion*.

d. Spot R^3 — M^1 larger than the spot in front of it.

e'. Forewing semitransparent distally; cell-spot large; band of hindwing entering cell, pinkish cream proximally . . . *P. anchises serapis* and a subsp. of *P. iphidamas*

f'. Forewing opaque, cell-spot large; band of hindwing less pale proximally A subspecies of *P. lycimenes*.

g'. Forewing opaque, cell-spot narrower; band of hindwing broad, entering cell, beneath more rosy, and black distal marginal area wider than in the other females *P. anchises alyattes*.

For some other distinctions see the note under the respective heading of each species. The geographical variability of the various species is not the same.

Scent-organ and genitalia of *P. lycimenes* essentially as in *P. certumnus*.

Early stages not known.

Hab. Guatemala to Ecuador.

a. *P. lycimenes lycimenes* Boisd. (1836).*

♂. *Papilio lycimenes* Boisduval, *l.c.* (Costa Rica).

♂ ♀. *Papilio iphidamas*, Godman & Salvin (*non* Fabricius, 1793, *err. det.*), *Biol. Centr. Amer., Rhop.* ii. p. 192. n. 4. t. 65. fig. 5, 5a. ♂-fold, *genit.* (1890) (*partim*).

♂. *Papilio alyattes*, *iid.* (*non* Felder, 1861, *err. det.*), *l.c.* p. 194. n. 5 (1890) (Panama).

♂. *Upperside*.—Forewing: olive-green patch limited behind by SM^2 , always reaching this vein, often a small streak behind this vein, many specimens with green scaling in cell; a creamy spot R^3 — M^1 present in almost every specimen, being absent only in a few of the individuals from the southern limit of the range (Chiriqui); a second creamy spot occasionally behind M^1 , and often also a creamy spot in cell.—Hindwing: a band of four, five or six spots, narrowing costad, the last spot standing behind M^2 , narrower than the last but one, but nearly as long.

Underside.—Forewing: white spots as above, many specimens with a dot in cell and some ill-defined creamy scaling in front of cell.—Hindwing with a band of five to seven spots, the upper two small, sometimes vestigial, the first occasionally absent.

♀. Forewing: creamy white spot R^3 — M^1 much larger than spot R^2 — R^3 .—Hindwing: band broad, uniformly red or proximally a very little paler than distally, its proximal edge slightly convex or straight in most specimens.

Hab. Guatemala to Panama; islands off the west coast of Panama.

Occurs together with *P. iphidamas*, which it resembles. The male differs from *iphidamas* in the green patch of the forewing reaching down to SM^2 or beyond, in the spot behind M^2 of the hindwing being much larger, and in the tibiae being spinose. The female is distinguishable from the female of *iphidamas* by the second discal spot of forewing being larger than the first and by the band of the hindwing being less evenly curved.

In the Tring Museum: 42 ♂♂, 22 ♀♀, from: Polochic Valley, Guatemala (Salvin); San José, Costa Rica, 4000 ft., September 1904 (A. Hall); Carillo, Costa Rica, 3000 ft., October 1904 (A. Hall); Juan Vinas, Costa Rica, 2500 ft., October 1904 (A. Hall); Carillo, June—July 1903 (Underwood); Carthago and Careblanco

* In the bibliography of this and the allied forms we have quoted only such references as are accompanied by a description or figure, and a few others which we could verify by the examination of the specimens referred to.

de Sarapiquí, Costa Rica (Underwood); Volcan de Miravalles, Costa Rica (Underwood); Cebaco I., Brava I., and Sevilla I., January 1902 (I. H. Batty); Bogava, Chiriquí, 800 ft. (Watson); Colon.

b. P. lycimenes erythrus subsp. nov. (Pl. VI. fig. 33, 34).

- ♀. *Papilio zeuris*, Gray (non Lucas, 1852, err. det.), *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 46. n. 231. t. 9. fig. 7 (1852) (♂ alia species).
 ♀. *Papilio erythlion* (!), Wood (non Boisduval, 1836, err. det.), *Ins. Abroad* p. 552. fig. 302 (1883) (Bogota;—this species?)

This common Bogota insect has always been confounded with the Colombian forms of *P. iphidamas* and *P. anchises*. The main differences from these insects have been mentioned above (p. 472).

♂. *Upperside*.—Forewing: olive-green patch mostly broader than in the preceding form, and always reaching close to inner margin, but never entering cell; a small white spot present in some specimens, standing behind M^1 , there being occasionally also a tiny dot in front of M^1 , this latter spot more often marked on the underside.—Hindwing: four spots, contiguous, the first more or less rounded.

Underside: five, rarely six, spots on hindwing, paler than in the preceding; spot R^2 — R^3 farther away from cell.

♀. *Upperside*.—Forewing: discal spot R^3 — M^1 much larger than spot R^2 — R^3 , and also larger than in the previous subspecies.—Hindwing: band paler red than in Central American females, touching cell or entering it; spot SC^2 — R^1 small or absent.

Underside: white upper scales of band of hindwing in most specimens tridentate.

Hab. Colombia: Magdalena and Cauca valleys; Sta. Marta; Northern Venezuela.

Type: ♂ from Cundinamarca.

Most Venezuelan specimens have two white spots on forewing, separated by vein M^1 .

In one of our males, probably from Bogota, the patch on the upperside of the hindwing is orange.

In the Tring Museum 90 ♂♂, 8 ♀♀, from: Pereira, Cauca valley; Muzo, December 1896; Purnio, Magdalena valley, October—November 1896 (Dr. Bürger); Cananche, Cundinamarca, July 1903 (Mathau); Pacho; Tachira and Mérida, Venezuela (Briceño).

c. P. lycimenes paralius subsp. nov. (Pl. VI. fig. 31).

A very distinct, small form.

♂. *Upperside*.—Forewing: green patch as in *erythrus*; a round creamy spot M^1 — M^2 .—Hindwing: red patch smaller than in the preceding, consisting of four spots; first spot minute, sometimes absent.

Underside: white spot of forewing large, touching both M^1 and M^2 ; four red spots on hindwing, first sometimes absent; no spot on abdominal fold.

♀. *Upperside*: forewing less opaque than in the previous forms; spots purer white; cell-spot reduced, triangular, being the smallest of the three spots present, rarely reaching halfway across cell; no spot between R^2 and R^3 ; spot R^2 — M^1 triangular, being obliquely truncate distally, separated from the cell-spot by the

black vein; spot M^1 — M^2 the largest, either oblong or proximally narrowed, being reduced behind.—Hindwing: band rather more rosy than in *erythrus*, much narrower than the brown-black distal area, not entering cell, almost straight, extending from abdominal edge to R^2 or a little beyond.

Underside: white patches sometimes larger than above, and band of hindwing paler, usually consisting of four spots R^2 —(SM^1), the abdominal spot (SM^1)— SM^2 being rarely present; some specimens with a minute dot before R^2 .

Hab. West Ecuador: Guayaquil; Chimbo; La Chima.

In the Tring Museum 11 ♂♂, 5 ♀♀, from: Chimbo, 1000 ft., August 1897 (Rosenberg); Naranjas, Guayaquil (O. T. Baron).

32. *Papilio erithalion* Boisduval. (1836).

♀. *Papilio erithalion* Boisduval, *Spec. Gén. Léop.* i. p. 295. n. 125 (1836) (Colombia; "Jamaica" false).

♂. *Papilio pyrochles* Doubleday, *Ann. Mag. N. H.* xiv. p. 416 (1884) (Colombia).

♂. Tibiae spinose. No distinct red streak behind M^2 of hindwing, usually no red scales whatever behind this vein.

♀. Spot R^3 — M^1 of forewing smaller than spot R^2 — R^3 , often minute or absent, or larger, but then band of hindwing wider than in the respective form of *lyeimenes* and proximally paler; fringe-spots generally large.

Genitalia: ♂. Harpe less dentate than in *P. lyeimenes*, more curved.

Early stages not known.

Hab. Costa Rica to Colombia and Northern Venezuela.

a. *P. erithalion zeuxis* Lucas (1852).

♂. *Papilio rhamases* Doubleday, *List Lep. Ins. Brit. Mus.* i. p. 147 (1845) (Venezuela; *nomen nudum*; haec species?).

♂. *Papilio rhesus* Kollar, *Denkschr. K. Ak. Wiss. Wien, Math. Nat. Cl.* i. p. 353. sub n. 7 (1850) (Klug in litt.; indescr.; haec species?).

♂. *Papilio zeuxis* Lucas, *Rev. Zool.* (2). iv. p. 190 (1852) (Venezuela;—coll. Oberthür); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 46. n. 231. t. 9. fig. 6. (1852) (♂ only, ♀ alia species); Lucas, in Casteln., *Voy. Amér. Sud, Ent.* p. 198, *Léop.* t. 2. fig. 3 (1857) (upper white dot exaggerated).

♀. *Papilio erithalion*, Gray (non Boisduval, 1836, err. det.), *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 46. n. 230. t. 10*. fig. 4 (1852) (Venezuela; ♂ alia species).

♂. *Papilio rhamases* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 293. n. 58 (1861) (type: Gray, *l.c.* t. 9. fig. 6; no description).

♂. *Papilio rhesus* Felder, *l.c.* (sub synonym.).

♂. *Papilio abilius* Felder, *l.c.* (sub synonym.).

♂. *Papilio rhamases* (?), Boisduval, *Consil. Léop. Guatem.* p. 7 (1870).

♂. *Upperside*.—Forewing: green patch strongly narrowing discally, rarely extending forward a little beyond M^1 ; a rather large rounded creamy white spot M^1 — M^2 , often followed by a second spot and not rarely preceded by a third, the white spots being seldom missing.—Hindwing: three, seldom two, small red spots, sometimes a vestige of a fourth spot behind M^2 .

Underside: forewing always with two or three white spots, one of them usually grey or vestigial.—Hindwing usually with five spots, the central discal ones often touching cell; the spot on abdominal fold sometimes absent, a few specimens bearing a sixth spot before R^2 .

♀. We are not sure that the female figured by Gray really belongs to this species. We have several specimens agreeing fairly well with the figure. The second discal spot of the forewing larger than the first, as is the case also in

the female of *P. lycimenes erythrus*; the band of the hindwing entering cell, being proximally much paler than distally.

Hab. Northern Venezuela, and Colombia east of the Cordillera of Bogota.

In the Tring Museum 23 ♂♂, 5 ♀♀, from: Cúca, Valencia, Caracas, Puerto Cabello, Mérida, and Cumana, in Venezuela; Peperital to Buenavista, Eastern Colombia, January 1897, 400—1300 m., dry (Dr. Bürger).

b. P. erithalion erithalion Boisd. (1836).

♀. *Papilio erithalion* Boisduval, *l.c.*; Felder, *Reise Novara, Lep.* p. 25. n. 15. t. 6. fig. d (1865).

♂. *Papilio pyrochles* Doubleday, *Ann. Mag. N. H.* xiv. p. 416 (1846) (Colombia); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 46. n. 229. t. 9. fig. 2 (1852) (*partim*; ♂ only).

♂. *Papilio phaenon* Kollar, *Denkschr. K. Ak. Wiss. Wien, Math. Nat. Cl.* i. p. 353. n. 7. t. 42. fig. 5. 6 (1850) (Cundinamarca).

♀. *Papilio alyattes* Felder, *Wien. Ent. Mon.* v. p. 73. n. 7 (1861) (♀ only).

♂. *Upperside*.—Forewing: olive-green patch extending from inner margin to M^1 , seldom beyond, very often reduced and ill-defined; white spot rarely present, standing between R^1 and M^1 (not M^1-M^2 as in the Venezuela form), usually narrow, oblique, and separate from the green patch.—Hindwing: three red spots R^2-M^2 , occasionally a vestige of a spot behind M^2 , sometimes a dot SC^2-R^1 , rarely another dot R^1-R^2 , and still more rarely a sixth dot before SC^2 (a specimen in the Vienna Museum).

Underside: Forewing often with a greenish grey spot R^3-M^1 in specimens which have no white dot on npperside, preceded sometimes by a second dot; the spot R^3-M^1 white in specimens with white dot on npperside; sometimes a cloud of whitish scales in front of cell, rarely condensed to a white elongate-triangular spot.—Hindwing usually with five spots, which are on the whole farther away from cell than in the previous subspecies, often seven spots, very rarely eight.

♀. *Upperside*.—Forewing: spot R^3-M^1 smaller than R^2-R^3 , many specimens with small spots distally of apex of cell; cell-spot large, close to cross-veins.—Band of hindwing very variable, spot R^3-M^1 longer than its distance from distal edge of wing.

Hab. Colombia: Magdalena valley; Cordillera of Bogota.

In the Tring Museum: 90 ♂♂, 40 ♀♀, from: Valdivia, July 1897 (Pratt); La Palma, August, Guadalupe, September, Cananche, July and August, Pizarra, August 1903, Cundinamarca (Mathan); Muzo, January 1898 and December 1896; Purnio, October—November 1896 (Dr. Bürger); La Vega, east of Bogota, 1900 m., January 1897, dry (Dr. Bürger); Pacho; Villavicencio.

c. P. erithalion cauca Oberth. (1880).

♂♀. *Papilio erithalion cauca* Oberthür, *Et. d'Ent.* iv. p. 84. sub n. 276 (1880) (Cauca).

♂♀. *Papilio cauca*, Staudinger, *Exot. Taf.* p. 13. t. 9. ♂ (1884) (Cauca).

While in *P. lycimenes* and *P. iphidamas* the males from the Cauca valley have the green patch of the forewing as large as it is in the specimens from the Magdalena valley, the Cauca males of *P. erithalion* have the green patch absent or vestigial. This fact proves conclusively that *P. erithalion* is specifically distinct from the other two insects.

♂. *Upperside*.—Forewing: green patch absent or vestigial; no white spot.—Hindwing with three spots, mostly separated from one another, rarely preceded by one or two minute dots.

Underside.—Forewing not seldom with glaucous grey spot R^3-M^1 and an

elongate-triangular spot before cell.—Hindwing usually with five spots, sometimes with six or seven, distant from cell.

♀. *Upperside*.—Forewing: cell-spot close to cross-veins, an elongate-triangular spot in front of cell and several small ones on distal side of cross-veins; discal spots R^2 — R^3 larger than spot R^3 — M^1 , the latter rarely touching M^1 .—Hindwing: band narrow, evenly curved, situated about halfway between cell and distal margin.

Underside like upper, band of hindwing paler.

Hab. Colombia: Cauca valley.

In the Tring Museum 30 ♂♂, 10 ♀♀, mostly from Pereira.

In coll. Oberthür a long series of both sexes from Manzales and Pereira.

d. P. crithalion sadyattes Druce (1874).

♂. *Papilio sadyattes* Druce, *Ent. Mo. Mag.* xi. p. 36 (1874) (Costa Rica); Kirby, *Cat. Diurn. Lep.* p. 814. n. 389 (1877); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 195. n. 7. t. 65. fig. 4 (1890) (Costa Rica); iid., *l.c.* p. 728 (1901) (Costa Rica).

Papilio iphidamas, iid., *l.c.* p. 192. n. 4 (1890) (*partim*).

♂. *Upperside*.—Forewing: olive-green patch very variable, either large, extending from inner margin to R^3 , or reduced in length and width, or altogether absent, our series showing all intergradations between the extremes; black specimens being known from Costa Rica and Chiriqui, in which localities occur also specimens with large olive-green patch; all individuals with at least one small creamy spot, most specimens with a large spot, the spot standing either before or behind R^3 , there being often a spot at both sides of the vein; sometimes an olive-green streak in cell, but no creamy spot.—Hindwing: three spots, often preceded by one or two dots, there being occasionally also a minute dot behind M^2 .

Underside.—Forewing: always one or two white or buffish white spots on disc, and the majority of specimens with a sharply defined elongate-triangular spot in front of cell.

♀. *Upperside*.—Forewing: spot R^3 — M^1 minute or absent; in our only Costa Rica specimen which we place here, spot R^2 — R^3 small, oblique, a very little larger than in the figure of ♂ in *Biol. Centr. Amer., l.c.*, the cell-spot of this specimen also reduced, narrower, transverse, not reaching across cell, no other spots.—Hindwing: in the Costa Rica specimen the band evenly curved, separate from cell, half as wide again as black distal border; in the specimens from the more southern localities the band entering cell, twice as broad as the distal marginal border, almost uniformly orange-red.

Hab. Islands off West Coast of Panama; Chiriqui; Costa Rica.

The males with large olive-green patch on forewing are distinguished from *P. lycimenes lycimenes* by the absence of a red streak behind M^2 on the upperside of the hindwing.

In the type of *sadyattes* the white dot on the upperside of the forewing stands behind R^3 .

The males without olive-green patch and the above-mentioned female with reduced spots on forewing lead over to the next species, which has in both sexes an entirely black forewing, very few specimens bearing a creamy white dot R^2 — R^3 .

In the Tring Museum 23 ♂♂, 4 ♀♀, from: Brava and Sebaco Is., January 1902 (J. H. Batty); Boquete, Chiriqui, 2500 ft. (Watson); Carillo, Costa Rica, 3000 ft., October 1904 (A. Hall); Limon, Costa Rica, October 1904 (A. Hall).

33. *Papilio polyzelus* Feld. (1865).

- ♂. *Papilio anchises*, Doubleday (non Linné, 1758, err. det.), *List Lep. Ins. Brit. Mus.* i. p. 12 (1845) (*partim*; Honduras).
 ? *Papilio alector* Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 341, 357 (1861) (*nom. nud.*; haec spec.?).
 ♂ ♀. *Papilio polyzelus* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 293. n. 54 (1864) (*nom. nud.*; Mexico; Honduras); id., *Reise Novara, Lep.* p. 24. n. 14. t. 6. fig. a. ♂ (1865) (Mexico).

The differences between this insect and black specimens of *P. crithalion* are very slight. A more exhaustive exploration of Nicaragua and Honduras may possibly furnish material of specimens completely connecting *P. e. sadyattes* with *P. polyzelus*.

The differential characters of the two subspecies of *P. polyzelus* are highly interesting. We have mentioned under *P. vertumnus* that one of the subspecies of that species has the tibiae of the male hairy, while they are simply spinose in the other subspecies. In *P. polyzelus* we meet with the same phenomenon. The males from Western Mexico have hairy and somewhat incrassate tibiae, while those from Eastern and South Mexico, Guatemala and Honduras have spiny tibiae, both forms differing also somewhat in pattern. In a classification which is based strictly on the quantity of difference, the forms of *P. vertumnus* and *P. polyzelus* with hairy male tibiae would have to be treated as specifically distinct from the forms with spinose male tibiae. But in a system based on true relationship (as far as we are able to make out relationship from the morphological and biological characters known) all the circumstances have to be taken into account. As the spiny-legged *P. lycimenes* and *P. crithalion* are very closely related to hairy-legged *P. iphidamas*, it is quite natural that the difference which is constant and specific in these insects should appear in other species as a difference between geographical forms, the development of a species into geographical forms being the first step towards the splitting up of one species into more species which can exist side by side, no longer being separated geographically, as are the geographical forms.

♂ ♀. Sexes similar, female a little paler than male; forewing rarely with white dot R²—R³ (some Honduras males), on underside occasionally grey scaling in front of cell. Hindwing with red band from SC² to abdominal margin, standing much nearer distal margin than in the allied species.

Early stages not known.

Hab. Mexico to Honduras.

Two subspecies.

a. *P. polyzelus polyzelus* Feld. (1865).

- ♂. *Papilio anchises*, Doubleday (non Linné, 1758, err. det.), *l.c.* (1845) (*partim*; Honduras); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 19 n. 224 (1847) (*partim*); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 64. n. 283 (1852) (*syn. excl.*; Honduras); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 74. n. 299 (1856) (*syn. excl.*; Honduras); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 146 (1863).
 (?) *Papilio alector* Bates, *l.c.*
 ♂ ♀. *Papilio polyzelus* Felder, *l.c.*; Kirby, *Cat. Diurn. Lep.* p. 527. n. 61g. (1871) (Mexico); Oberth., *Et. d'Ent.* iv. p. 82. n. 270 (1880) (Mexico); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 195. n. 8. t. 65. fig. 6. *genit.* (1890) (*partim*).
Papilio candesci Borre (Belval *ined.*), *C. R. Soc. Ent. Belg.* xxviii. p. 126 (1884) (= *polyzelus*).

♂ ♀. Tibiae of male spinose, non-incrassate.

Genitalia: ♂. Harpe acuminate, no teeth between ventral conical tooth and apex.

Hab. Eastern Mexico, southwards to Honduras.

In the Tring Museum 44 ♂♂, 16 ♀♀, from: S. Pedro Sula, Honduras; Escuintla, W. Guatemala, 1100 ft., August 1904 (A. Hall); Mazatenanga, W. Guatemala, 1000 ft., September 1904 (A. Hall); Saba, Vera Paz, Guatemala (Champion); "Mexico"; Coatzacoalcos, July 1904 (A. Hall); Orizaba.

b. P. polyzelus trichopus subsp. nov.

♂ ♀. *Papilio polyzelus*, Godm & Salv., *l.c.* (West Mexico).

♂ ♀. Tibiae and first tarsal segments hairy and somewhat incrassate. Spots of hindwing on the whole larger and nearer to the margin than in the preceding, the band being in one of the females only $2\frac{1}{2}$ mm. distant from cell, in male usually a small spot behind M^2 . The posterior marginal spots of fore- and hindwing often edged with red.

Genitalia: ♂. Harpe distally broader than in the preceding, denticulate.

Hab. West Mexico: Guerrero; Michoacan; Jalisco.

In the Tring Museum 64 ♂♂, 25 ♀♀, from: Guerrero, type (O. T. Baron); Patzcuaro, Michoacan; S. Sebastian (Dr. Buller).

34. *Papilio iphidamas* Fabr. (1793). (Pl. IV. fig. 7.)

♀. *Papilio Eques Trojanus iphidamas* Fabricius, *Ent. Syst.* iii. 1. p. 17. n. 52 (1793) (type: Jones's drawing).

♂. Tibiae and first tarsal segments somewhat incrassate and densely hairy.

♀. Forewing: spot R^2 — R^3 larger than R^3 — M^1 (Central American form), or smaller (South American forms). For differences between the Colombian females of this species and the females of the allied insects see p. 472.

Genitalia: ♂. Harpe more curved than in *P. lycimenes* and *erithalion*, besides the large ventral tooth with several small teeth, which are variable in size and number.

Hab. Mexico to Ecuador and North Venezuela.

The drawing of Jones, upon which the name *iphidamas* is based, represents in our opinion a Central American female of the present species. The band of the hindwing is too uniformly red for a South American female of this or any allied species. The *P. idaeus* of Fabricius, likewise described from Jones's drawing, is also a Central American form.

As only *P. iphidamas* is known to extend into Mexico as far north as Vera Cruz, there can hardly be any doubt that the Central American males are mated correctly with the females described below. It is interesting to observe that the proportional size of the two discal spots R^2 — M^1 of the forewing (♀) is reversed in the forms from Colombia and Ecuador, as is the case also in several other *Papilios*.

a. P. iphidamas iphidamas Fabr. (1793).

♀. *Papilio Eques Trojanus iphidamas* Fabricius, *l.c.* (no locality given).

♀. *Papilio iphidamas*, Godart, *Enc. Méth.* ix. p. 37. n. 34 (1819) (copied from Fabricius); Boisd., *Spec. Gén. Lép.* i. p. 292. n. 121 (1836) (copied from Fabricius); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 19. n. 220 (1847) ("S. America" false); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 44. n. 225. t. 8. fig. 1. ♂, 2. ♀ (1852) (Honduras; Mexico); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 60. n. 238 (1856) (Mexico; Honduras); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 341, 357 (1861) (Mexico; Honduras); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 117 (1863) (= *arcas*, false); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 293. n. 53 (1864) (Mexico; Nicaragua; Honduras; *partim?*); Butler, *Cat. Diurn. Lep. descr. Fabric.* p. 236. n. 8 (1869) ("Bogota specimen agreeing with Jones's figure," false); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 192. n. 4. (1890) (*partim*).

- ♂. *Papilio arcas*, Doubleday (non Cramer, 1782, err. det.), *List Lep. Ins. Brit. Mus.* i. p. 12 (1845) ("S. America" false).
- ♀. *Papilio panarens* Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 45, n. 226, t. 10, fig. 4 (1852) (Mexico); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 60, n. 239 (1856); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 341, 357 (1861) (*partim*; ♂ alia spec.); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863); Felder, *Lc.* p. 294, n. 67 (1864).
- Papilio serapis*, Ménétiers (non Boisduval, 1836, err. det.), *Enum. Corp. Anim. Mus. Petrop., Lcp.* i. p. 5, n. 76 (1857) (syn excl.; haec spec.?).
- ♂ ♀. *Papilio echelus*, Reakirt (non Hübner, 1806—, err. det.), *Proc. Ent. Soc. Philad.* ii. p. 138, n. 7 (1863) (Nicaragua; syn. excl.; haec spec.?).
- ♂. *Papilio achelous* Hopffer, *Stett. Ent. Zeit.* xxvii. p. 22 (1866) (Central America).
- ♀. *Papilio vertumnus* var. h. *P. iphidamas*, Kirby, *Cat. Diurn. Lep.* p. 526, sub n. 61 (1871) ("New Granada" false).
- ♂. *Papilio asclepius*, id., *Lc.* p. 537, n. 126 (1871) (*partim*; *achelous* Hopff. sub syn.).
- ♂. *Papilio incandescens* Butler, *Trans. Ent. Soc. Lond.* p. 433, t. 6, fig. 1 (1874) ("Para" false; this subsp. according to type in coll. Godman).
- ♂ ♀. *Papilio lycimenes*, id. & Druce (non Boisduval, 1870, err. det.), *Proc. Zool. Soc. Lond.* p. 363, n. 362 (1874) (Costa Rica).
- ♂ ♀. *Papilio olyattes*, Staudinger (non Felder, 1861, err. det.), *Exot. Tagf.* p. 13, t. 8. ♂ ♀ (1884) (this locality? this species?).

♂. *Upperside*.—Forewing: apex not semitransparent; green patch usually much reduced, seldom extending to hindmargin, being on the whole longer in the southern than in the northern specimens; always one or two creamy white spots, often a white spot in cell.—Hindwing: band gradually widening behind, extending usually from SC^2 to M^2 , with a narrow streak behind M^2 , the first spot often small, rarely absent.

Underside.—Forewing always with white creamy spot R^3-M^1 , mostly also with spot R^2-R^3 and a cell-spot, the latter often reaching across cell.—Band of hindwing from SC^2 to anal angle, widest between R^2 and M^2 .

♀. *Upperside*.—Forewing: cell-spot close to cross-veins, square or oblong; a triangular streak in front of cell; discal spot R^3-M^1 smaller than R^2-R^3 , often absent, rarely larger, but in this case gradually tapering proximally, its oblique hinder edge being continuous (or almost) with the proximal edge of the cell-spot; usually one or more dots at distal side of cross-veins.—Hindwing: band nearly uniformly red, variable in width, but always nearly evenly curved.

Hab. Southern Mexico to Panama.

Some of the southern individuals leading over to the next form.

In the Tring Museum 73 ♂♂, 30 ♀♀, from: Coatzacoalcos, Mexico, at sea level, July 1904 (A. Hall); Escuintla and Mazatenanga, W. Guatemala, 1100 and 1000 ft., August and September 1904 (A. Hall); S. Pedro Sula, Honduras; Nicaragua; Juan Vinas, 2500 ft., August, Carillo, 3000 ft., October 1904, Costa Rica (A. Hall); Juan Vinas, Escazu, Limon, San José, and Tarbaca, Costa Rica (Underwood); Bogava, 800 ft., and Boquete, 3500 ft., Chiriqui (Watson); Brava, Cebaco, and Sevilla Is., January 1902 (J. H. Batty).

b. P. iphidamas phalias subsp. nov.

♂. *Upperside*.—Forewing: olivaceous green patch from hinder margin to M^1 or beyond, widest behind, the streak along hinder margin being rarely somewhat reduced in length and width; no green sealing in cell; no white spot, except in a very small percentage of specimens, the spot standing usually behind M^1 .—Hindwing: three red spots, separate from cell, often a minute streak or dot behind M^2 , rarely a dot in front of R^2 , sometimes only two spots present.

Underside.—Forewing often with a greyish white spot across M^1 or in front of M^2 .—Hindwing with three spots R^2-M^1 , a smaller one behind M^1 and usually a minute dot on abdominal fold.

♀. *Upperside*.—Forewing: apical area slightly transparent, being visibly less opaque than in the Colombian subspecies of *P. lycimenes* and *P. erithalion*; cell-spot very large, longer than broad, often somewhat reduced in width costally, in this case not quite reaching across cell; subcostal streak often absent, discal spot R^3-M^1 much larger than spot R^2-R^3 .—Hindwing: band very broad, entering cell, very pale proximally, spot SC^2-R^1 small or absent in most specimens.

Underside: spots of forewing purer white, and band of hindwing distally brighter red than above.

Hab. Colombia: Magdalena valley, and Cordillera of Bogota.

In the Tring Museum 30 ♂♂, 13 ♀♀, from: Cananche and La Palma, Cundinamarca, July, August and September 1903 (Mathan); Muza, December 1896; Pacho; Peperital to Bnavista, 400—1300 m., January 1897, dry season (Dr. Bürger); Villavicencio to Monte Redondo, March—April 1897, beginning of wet season (Bürger).

c. P. iphidamas elatos ssp. nov.

♂. Like the preceding; green patch of forewing more olive, duller in tint, posteriorly reduced, the streak behind SM^2 small, the patch being rhombiform, with the upper proximal and posterior distal angles strongly rounded.—Three small spots on hindwing.

On *underside* five spots R^2-SM^1 on hindwing, all well separated from one another, spot R^3-M^1 the largest, being about half as long again as broad.

Hab. Cauca valley.

In the Tring Museum 1 ♂ from Popayan.

d. P. iphidamas calogyne subsp. nov. (Pl. IV. fig. 7).

♂. *Upperside*: forewing a little less opaque in apical area than in *phalias*; olive-green spot about the same in size, on the whole somewhat smaller, duller green; many specimens with a white spot M^1-M^2 , which is often large, touching both veins, being sometimes preceded by a small dot.—Hindwing: three small red spots, contiguous, often a minute dot behind M^2 .

Underside: forewing with white or greenish buff, distinct or vestigial, spot M^1-M^2 , or R^3-M^1 , or a double-spot across M^1 , or the spot larger, extending from M^2 forward to R^2 .—Hindwing: five spots from R^2 to anal angle, last one often absent, the spots on the whole less pale and smaller than in *P. i. phalias*, the upper three close together.

♀. *Upperside*: forewing: apical area slightly transparent; cell-spot large, but often reduced costally, in this case not reaching across cell; subcostal streak present or absent; two discal spots R^2-M^1 , the second the largest.—Hindwing: band from R^2 to near abdominal edge, often a detached dot before R^1 , the band bright red, usually almost white proximally, the two colours contrasting strongly, inner edge of band almost straight, but more or less curved distad before abdominal margin, sometimes also incurved at apex of cell, in many specimens band entering apex of cell; width of band variable, but not exceeding (or very little) the width of the distal marginal area.

Underside: spots of forewing a little larger than above, cell-spot reaching across cell in all specimens, subcostal streak present.—Hindwing: band paler than above, narrower posteriorly, spot SC^2-R^1 nearly always indicated.

Hab. West Ecuador and West Colombia.

The West Colombian males have rarely a white spot on the forewing, being hardly distinguishable from *phalias*, while the females agree well with Ecuadorian ones.

In the Tring Museum 20 ♂♂, 16 ♀♀, from: Paramba, 3500 ft., February, March and April 1897, dry (Rosenberg); Chimbo, 1000 ft., August 1897 (Rosenberg); Cachabi, low country, January 1894 (Rosenberg); Zaruma, June 1899, 1000 m., wet (Simons).—13 ♂♂ from Rio Dagna, W. Colombia (Rosenberg).

e. P. iphidamas teneates subsp. nov.

♂. *Papilio osyris*, Godman & Salv. (*non* Felder, 1861, err. det.), *Trans. Ent. Soc. Lond.* p. 126. n. 231 (1880) (Sta. Marta).

♂. *Upperside*, forewing: apical area usually rather more transparent than in *P. i. phalias*; green patch narrow, separate from cell; most specimens with one or two white spots.—Hindwing with three red spots, separate from cell, often a small spot behind M^2 , sometimes an additional dot behind R^1 .

Underside: forewing with one, two or three white spots.—Hindwing with four to seven spots in an almost straight row, somewhat resembling the band of *alyattes*. ♀ not known.

Hab. North Venezuela, and Santa Marta, Colombia; name-type from Cucuta, Venezuela.

Resembling *alyattes* in being rather more glossy blue on the hindwing than in *P. i. phalias*, in the green patch of the forewing being reduced in width, the streak along inner margin being often obsolescent (*type*), and in the forewing bearing often rather large white spots. The hindwing, however, is not so glossy as in *alyattes*, the spots of the underside are less close to cell, and the spot behind M^2 of hindwing is smaller. The harpe is also somewhat different, being narrower and more curved, agreeing with that of *P. i. phalias*.

In the Tring Museum 9 ♂♂ from: Cucuta and Porto Cabello, Venezuela; Onaca, Santa Marta, 2200 ft. (Chas. Engelke); R. Hacho, Santa Marta, March 1898 (Wilmot Brown).

35. *Papilio anchises* L. (1758) (Pl. IV. fig. 8. 12.; VII. fig. 44—47).

♀. *Papilio Eques Trojannus anchises* Linné, *Syst. Nat.* ed. x. p. 460. n. 10 (1758) (cit. exceptis); Clerck, *Icon. Ins.* ii. t. 29. fig. 1 (1764).

♂♀. *Papilio anchises*, Boisduval, *Spec. Gén. Léop.* i. p. 291. n. 119 (1836).

♂. Tibiæ and first tarsal segments somewhat incrassate and densely hairy. Apical area of forewing semitransparent. Hindwing strongly glossy blue on disc; red spots rather closer to cell than in *P. i. phalias*, variable in number and in size, often forming a continuous band, many specimens bearing a small spot behind M^2 .—Spot M^2 —(SM^1) of *underside* of hindwing rather larger and more proximal than in *P. iphidamas*, the band of spots extending usually forward to SC^2 .

♀. Apex of forewing somewhat transparent; discal spot R^2-R^3 smaller than spot R^3-M^1 .

Early stages only known of *P. a. orbignyanus*.

Hab. South America, from Colombia to Pará, Sao Paulo, Bolivia, and Paraguay. Not known from Peru.

We are not sure that the forms here united under *P. anchises* are specifically distinct from those treated as subspecies of *P. iphidamas*. It is very well possible that all these forms of which the males have hairy tibiae are only geographical varieties of one single species. Our knowledge of the distribution of these *Papilios* in Colombia is very imperfect, and the material examined too scanty for the purpose of deciding the question.

a. P. anchises alyattes Feld. (1861).

♂ ♀. *Papilio alyattes* Felder, *Wien. Ent. Mon.* v. p. 73. n. 7 (1861) (*partim*, ♂ only; Bogota); id., *Verh. Zool. Bot. Ges. Wien* xiv. p. 293. n. 57 (1864); id., *Reise Novara, Lep.* p. 26. n. 16. t. 6. fig. e. ♂, f. ♀ (1865).

Papilio vertumnus var. k. *P. alyattes*, Kirby, *Cat. Diurn. Lep.* p. 526 sub n. 61 (1871) (New Granada).

♂. *Upperside*: forewing distally somewhat transparent, but less than in the following forms; green patch reduced, not touching cell, streak behind SM² often vestigial; always at least one white spot, situated between M¹ and M², often a second spot before M¹, some specimens having also a dot behind M².—Hindwing much more strongly glossy blue than in all the allies, the scales on the disc being entire; three red spots, the last usually the largest, often a minute spot behind M² and another before R².

Underside: red band of hindwing extending forward to SC², spot M²—(SM¹) large as compared with the respective spot in *P. iphidamas phalias*.

♀. *Upperside*: forewing less opaque distally than in *P. iphidamas*; cell-spot transversely longer than broad, narrower than in *P. i. phalias*; two discal spots, the second larger than the first, separated from cell or touching it behind R³.—Hindwing: band crossing apex of cell, almost gradually widened behind, reaching forward to SC², its distal edge farther away from margin of wing than in *P. iphidamas*.

Genitalia: ♂. Harpe decidedly broader and less curved than in *P. iphidamas*, the ventral median tooth smaller, being sometimes not larger than the other teeth.

Hab. Colombia: Magdalena valley, probably on both sides of the Cordillera of Bogota.

In the Tring Museum: 13 ♂♂, 5 ♀♀, from "Bogota."

b. P. anchises serapis Boisd. (1836).

♂. *Papilio serapis* Boisduval, *Spec. Gén. Léop.* i. p. 298. n. 130 (1836) (Colombia); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 196 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 45. n. 227 (1852) (*partim*; ♂ only; ♀ alia species); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 61. n. 240 (1856) (*partim*); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 249. n. 65 (1864) (*partim*); Kirby, *Cat. Diurn. Lep.* p. 526. n. 61 d (1871) (*partim*); Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 126. n. 232 (1880) (Sta. Marta); Prinz, Theresa, *Berl. Ent. Zeitschr.* xlv. p. 241. n. 4 (1901) (La Popa, Cartagena, August, 2 ♂♂;—we have seen one of them).

♂. *Upperside*: forewing rather more transparent distally than in *alyattes*; green band very narrow, usually extending forward to R³, a little wider behind than in front.—Hindwing: band consisting of five spots, there being usually a sixth minute spot or narrow streak behind M².

Underside: the band of the hindwing as in *alyattes*.

♀. *Upperside*: forewing more transparent distally than in *alyattes*; spots more yellow, as are also the fringe-spots on both wings; cell-spot subtriangular, not reaching across cell, no spot in front of cell; discal spot R³—M¹ very much larger than spot R²—R³, but much smaller than the cell-spot.—Hindwing: band

very broad, buff or yellow proximally, strongly palmate, its inner edge crossing cell proximally of base of M^2 , spot SC^2-R^1 larger than in *alyattes*; one of our two specimens with a dot before SC^2 .

Underside similar to upper, band of hindwing paler red.

The two specimens here described have the appearance of being killed too soon after emergence, which may account for the yellowish colour of the markings.

Hab. Northern Colombia: Santa Marta; Cartagena.

In the Tring Museum 2 ♂♂, 2 ♀♀, from "Bogota."

c. P. anchises osyris Feld. (1861).

- ♀. *Papilio erithalion*, Kollar (*non* Boisduval, 1836, err. det.), *Deutsche. K. Ak. Wiss. Wien, Math. Nat. Cl. i.* p. 353. n. 6 (1850) (Angostura).
- Papilio proteus*, Hewitson (*non* Boisduval, 1836, err. det.), *Trans. Ent. Soc. Lond. (2).* i. p. 97 (1851) (♂ of *arcas*, Venezuela!).
- ♂. *Papilio erithalion*, Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 46. n. 239. t. 10*. fig. 3. ♂ (1852) (Venezuela; *synon. excl.*); *id.*, *List Lep. Ins. Brit. Mus. i. Pap.* p. 61. n. 243 (1856) (*partim*).
- ♂♀. *Papilio osyris* Felder, *Wien. Ent. Mon. v.* p. 74. n. 8 (1861) (Caracas); *id.*, *Verh. Zool. Bot. Ges. Wien* xiv. p. 294. n. 66 (1864); *id.*, *Reise Novara, Lep.* p. 30. t. 9. fig. b. ♂, e. d. ♀ (1865).
- ♀. *Papilio xenares* *id.*, *Verh. Zool. Bot. Ges. Wien* xiv. p. 294. n. 59 (1864) (Orinoco; *nom. nov. loc. "erithalion Koll."*); *id.*, *Reise Novara, Lep.* p. 28. n. 17. t. 8. fig. a (1865) (Angostura).
- ♂. *Papilio toxaris* *id.*, *Verh. Zool. Bot. Ges. Wien* xiv. p. 294. n. 61 (1864) (*nom. nov. loco erithalion* Gray, *l.c.* t. 10*. fig. 3;—"f. 4" laps. cal.).
- ♂♀. *Papilio severus* *id.*, *Verh. Zool. Bot. Ges. Wien* xiv. p. 294. sub n. 66 (1864) ("Moritz in litt."; = *osyris*).
- Papilio arcas* var. a. *P. xenares*, Kirby, *Cat. Diurn. Lep.* p. 526. sub n. 61a (1871).
- Papilio toxaris*, *id.*, *l.c.* n. 61b (1871).
- Papilio serapis* var. a. *P. osyris*, *id.*, *l.c.* sub n. 61d (1871).
- Papilio arcas*, Hahnel (*non* Stoll, 1782, err. det.), *Iris* iii. p. 138 (1889) (San Estéban, in forest).

♂. Similar to *serapis*, bands of forewing and hindwing broader; white spots of forewing usually large, sometimes absent, occasionally a white spot in cell.

♀. Cell-spot of forewing reaching usually across cell, many specimens with a subcostal streak, two discal spots, R^2-M^1 , the second much the larger.—Band of hindwing only very little paler proximally than distally, usually entering apex of cell, variable in width, spot SC^2-R^1 rarely small.

Hab. Venezuela.

One single female from Ciudad Bolívar has the spots of the forewing pure white, while in the type of *xenares* from the same place they are only a little less buffish than in the more northern individuals. It is possible that these two specimens represent another subspecies; however, more material is wanted to decide the point. The specimens from Caicara and the Caura River belong to the next form.

In the Tring Museum 6 ♂♂, 6 ♀♀, from: Cúcuta; Mérida; Puerto Cabello; Ciudad Bolívar.

In coll. Oberthür 6 ♂♂, 4 ♀♀, from San Estéban.

d. P. anchises cymochles Doubl. (1844).

- ♂. *Papilio cymochles* Doubleday, *Ann. Mag. N. II.* xiv. p. 416 (1844) (Trinidad); *id.*, *List Lep. Ins. Brit. Mus. i.* p. 12 (1845); *id.*, Westw. & Hew., *Gen. Diurn. Lep. i.* p. 18. n. 205 (1846); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 50. n. 245. t. 10. fig. 8 (1852) (Trinidad); *id.*, *List Lep. Ins. Brit. Mus. i. Pap.* p. 64. n. 260 (1856) (Trinidad?); Bates, *Trans. Ent. Soc. Lond. (2).* v. p. 341, 357 (1861) (Trinidad?); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 294. n. 63 (1864) (Trinidad!); Kirby, *Cat. Diurn. Lep.* p. 526. n. 61c (1871) (Trinidad).
- ♂. *Papilio anacharsis* Felder, *l.c.* n. 62 (1864) (*hab.?*; *nom. nud.*); *id.*, *Reise Novara, Lep.* p. 29. n. 18. t. 7. fig. d. (1865) (*hab.?*).

♂. *Papilio toxaris* var. a. *P. anacharsis*, Kirby, l.c.

Papilio xexis (!), Kaye, *Proc. Ent. Soc. Lond.* p. 19 (1901) (= *alyattes*, both bred from one ♀; error of identification).

Papilio xexis, id., *Trans. Ent. Soc. Lond.* p. 206. n. 194 (1904) (Trinidad; "larvae on orange!!" fal-e.—These larvae belonged probably to *P. anchisiades*).

Papilio cymocles (!), id., l.c. n. 195 (1904) (Trinidad).

♂. Similar to *osyris*; band of forewing on the whole rather narrower, at least in many specimens, with one, two or three white spots; hindwing usually with three red spots, often preceded by a small spot and followed by a minute streak.

On *underside* most specimens with four spots on hindwing, often preceded by a small fifth, but one of our specimens with seven spots.

♀. Spots of forewing purer white than in the previous forms, the discal ones differently placed; cell-spot small, triangular, not reaching halfway across the cell, often a mere streak; two discal spots R^3-M^2 , the second extending farther distad than the first, occasionally a minute dot before R^3 .—Hindwing: band almost evenly red, widest in middle, no spot before R^1 .

On *underside* the last spot of the band of the hindwing much reduced, sometimes minute, usually isolated.

Hab. Trinidad; Peninsula of Paria; Orinoco.

In the Tring Museum 24 ♂♂, 17 ♀♀, from: Caicara, Orinoco, March 1897, May and July 1898 (Cherrie); Suapure, February 1899, La Vuelta, May 1904, Corosito, June 1904, Caura R. (S. M. Klages); Patao, Guiria, August 1891; various places on Trinidad, December, January and February.

e. *P. anchises anchises* L. (1758) (Pl. IV. fig. 8. 12).

♀. *Papilio Eques Trojanus anchises* Linné, *Syst. Nat.* ed. x. p. 460. n. 10 (1858) (cit. excl.); Clerck, *Icon. Ins.* ii. t. 29. fig. 1 (1764); Linné, *Mus. Lud. Utr.* p. 191. n. 10 (1764); id., *Syst. Nat.* ed. xii. p. 746. n. 11 (1767); Fabr., *Spec. Ins.* ii. p. 7. n. 26 (1775) (cit. excl.); Goeze, *Ent. Beytr.* iii. 1. p. 34. n. 11 (1779) (cit. excl.); Fabr., *Spec. Ins.* ii. p. 7. n. 26 (1781) (cit. excl.); Gmelin, *Syst. Nat.* i. 5. p. 2230. n. 11 (1790) (cit. excl.); Fabr., *Ent. Syst.* iii. 1. p. 13. n. 40 (1793) (cit. excl.).

Papilio Eques vertumnus Linné, *Syst. Nat.* ed. Lange, p. 460. n. 10 (1760).

Papilio (Troes) anchises, Müller, *Naturs.* v. 1. p. 569. n. 11 (1764) (larva exelusa).

♂. *Papilio Eques Trojanus vertumnus* Cramer, *Pap. Exot.* iii. p. 32. t. 211. fig. C (1779) (Surinam; non fig. A. B.).

Priamides vertumnus, Hübner, *Verz. bek. Schmett.* p. 87. n. 911 (1818?) (*partim*).

Papilio vertumnus, Godart, *Enc. Meth.* ix. p. 37. n. 38 (1819) (*partim*); Boisdu., *Spec. Gén. Lép.* i. p. 298. n. 129 (1836) (*partim*).

♂ ♀. *Papilio anchises*, Boisduval, l.c. p. 291. n. 119 (1836) (Surinam); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 293. n. 44 (1864) (Surinam); Guen., *Ann. Soc. Ent. France* p. 309 (1867) (descr. of ♀); Auriv., *Konigl. Sv. Vet. Ak. Handl.* xix. 5. p. 15. n. 10 (1882) (recensio critica; descr. of ♀; probably type specimen).

Papilio vertumnus var. a., Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 57. sub n. 266 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 69. sub n. 281 (1856).

♂. *Papilio telmosis* Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 340, 356 (1861) (Surinam; type: Cramer's fig. C, l.c.; "extends into Columbia" false); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 293. n. 45 (1864) (Surinam); Kirby, *Cat. Diurn. Lep.* p. 528. n. 62 f (1871); Möschl., *Verh. Zool. Bot. Ges. Wien* xxvii. p. 295 (1876) (Surinam); Oberth., *Et. d'Ent.* iv. p. 82. n. 273 (1880) (Guyane; variability; = *cteoctes*).

♂. *Papilio eteoctes* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 293. n. 49 (1864) (hab. ?; *nom. nud.*); id., *Reise Novara, Lep.* p. 22. n. 12. t. 7. fig. c. ♂ (1865) (hab.?).

Papilio cyphotes var. a. *P. eteoctes* Kirby, l.c. p. 527. sub n. 62 d (1871).

♂. *Upperside*.—Forewing: band very variable, extending from M^1 to inner margin, often being reduced to a narrow streak, not rarely altogether absent, all

intergradations occurring ; it varies also in colour, being sometimes bluish, sometimes greenish ; a white spot M^1-M^2 in some specimens.—Hindwing strongly dentate, mostly with three spots, which are usually well separated from one another and from cell, there being often a streak behind M^2 and occasionally a dot before R^2 ; the spots sometimes yellowish.

On *underside* of hindwing, a row of five to seven spots, usually placed rather nearer the distal margin than the cell.

♀. *Upperside*.—Forewing : no spot in cell or only a small streak, two spots R^3-M^2 on disc, the upper touching cell, or only one spot R^3-M^1 , touching cell or separate from it, or this spot vestigial, or the wing without any spots, except the fringe-dots.—Hindwing with a row of six or seven evenly red spots, all separate from each other and from cell, last two usually merged together.

Hab. Dutch and French Guiana.

In the Tring Museum 3 ♂♂, 2 ♀♀, from Surinam.

In coll. Oberthür a long series of both sexes from Maroni and Cayenne.

f. P. anchises thelios Gray (1852).

♀. *Papilio thelios* Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 52. n. 250. t. 10*. fig. 7 (1852) (Pará); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 256 (1854) (Pará; forest); Gray, *List Lep. Ins. Brit. Mus. i. Pap.* p. 65. n. 265 (1856).

♂♀. *Papilio hierocles* Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 53. n. 258. t. 10. fig. 2. ♂, t. 9. fig. 9. ♀ (1852) (Pará); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Amazons; forest); Gray, *List Lep. Ins. Brit. Mus. i. Pap.* p. 67. n. 273 (1856) (Pará); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 341, 356 (1861) (synonymy; "cyphotés" excl.; Pará); id., *Journ. Entom.* I. p. 225. n. 13. (1862); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 293. n. 48 (1864) (Pará); Oberth., *Et. d'Ent.* iv. p. 88. n. 277 (1880) (Pará); Wood, *Ins. Abroad* p. 551. fig. 301 (1883).

♀. *Papilio aglaope* Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 56. n. 260. t. 10. fig. 6 (1852) (♀ only, ♂ alia spec.; Pará); id., *List Lep. Ins. Brit. Mus. i. Pap.* p. 67. n. 275 (1856) (♀; Pará). *Papilio cyphotés*, Kirby (non Gray, 1852, err. det.), *Cat. Diurn. Lep.* p. 527. n. 62 a (1871) (*partim*); Maass. & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 89. n. 42 (1890) (Baïão, Lower Amazons).

♂. *Upperside*.—Forewing with triangular green patch and one or two white spots, seldom a minute third spot being present.—Hindwing nearly as strongly dentate as in *P. a. anchises*, with three or four separate red spots and often a narrow line behind M^2 , spot M^1-M^2 the longest.

On *underside* of hindwing a row of six separate pale red spots, of which the central ones stand nearer the cell than outer margin.

♀. *Upperside*.—Forewing with or without white cell-streak; two larger distal spots R^3-M^2 , often preceded by a small spot, spot M^1-M^2 the largest, oblong.—Hindwing : a row of seven or eight separate red spots, the last two merged together.

On *underside* the spots of the hindwing somewhat paler than above.

Hab. Lower Amazons: Pará to Santarem.

In the Tring Museum 2 ♂♂, 3 ♀♀, from Pará.

g. P. anchises etias subsp. nov. (Pl. VII. fig. 46. 47).

♂. Like *P. a. orbignyannus*, but spot SC^2-R^1 of hindwing absent, being rarely represented by a minute dot, the others on the whole somewhat shorter and narrower. Palpus sometimes almost entirely black.

♀. Spots of forewing pure white; cell-spot minute; a small spot before R^3 and

two large spots R^3-M^2 , not touching M^2 .—Spots of hindwing smaller, being shorter and narrower, than in *orbignyanus*; spot SC^2-R^1 sometimes missing.

Hab. Eastern Bolivia.

In the Tring Museum 11 ♂♂, 2 ♀♀, from : Santa Cruz de la Sierra, January, April—May 1904 (J. Steinbach); R. Grande, Province Cordillera, December 1903 (J. Steinbach).

In coll. Godman from Rio San Mateo.

h. P. anchises orbignyanus Lucas (1852).

♂. *Papilio orbignyanus* Lucas, *Rev. Zool.* (2). iv. p. 192, t. 10, fig. 3 (1852) (Corrientes); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* ii. p. 530 (1852); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 64, n. 256 (1856); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 341, 357 (1861); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 294, n. 64 (1864).

Papilio cymochles var. a. *P. orbignyanus*, Kirby, *Cat. Diurn. Lep.* p. 526, sub n. 61 c. (1871) (Corrientes).

♂. *Papilio serapis*, Burmeister (non Boisd., 1836, err. det.), *Deser. Rép. Argent.* v. *Lép.* p. 64, n. 6 (1878) (*partim*).

♂. Green patch of forewing rarely much widening posteriorly, its proximal and distal edges being parallel in most individuals; always a buffish white spot M^1-M^2 , often very large, usually also a second spot before M^1 and often a third behind M^2 .—Hindwing with an evenly curved band which gradually widens posteriorly, consisting of five spots and a line behind M^2 , the spots close together, but separate, the veins being black, rarely a dot in cell (type-specimen).

On *underside* of hindwing a row of seven spots, the last two being usually merged together.

♀. Forewing: a spot of variable size in cell, rarely absent, reaching sometimes halfway across cell; three spots R^2-M^2 on disc, the first minute, often absent, the second the largest, the third mostly rounded off behind and then not touching vein M^2 .—Hindwing: band from SC^2 to abdominal edge, separate from cell.

Larva reddish-brown; a spot at sides of the thoracic segments and of the last two abdominal rings, a dorsal spot on each side of mesial line on second and tenth rings, and an oblique, sometimes macular, side-band on sixth and seventh; tubercles of prothorax not longer than those on the following segments. Dorsal tubercle of thorax of pupa small, divided; abdomen with two pyramid-shaped dorsal tubercles and a smaller one in front of them.

Hab. Paraguay; adjacent district of Argentina; Matto Grosso; Province Goyaz in Brazil.

In the Tring Museum 16 ♂♂, 8 ♀♀, 6 larvae, 1 pupa, from: Formosa, Argentina; Patino cué, Paraguay, February 1894 (Montforts); Villa Maria to Diamantino, January 1897 (Audeer).

i. P. anchises foetterlei subsp. nov. (Pl. VII. fig. 44. ♂, 45. ♀).

♂. *Upperside*.—Forewing: two very large white patches R^3-M^2 , often followed by a smaller spot and usually accompanied by a minute streak in cell; bluish grey scaling between the white patches and inner margin, partly edging the patches, especially on distal side.—Hindwing: red band rather paler than in *orbignyanus*, broader, entering cell (always?), streak behind M^2 very distinct, inner edge of band almost straight from SC^2 to base of M^2 .

Underside paler than upper; white spots of forewing somewhat larger,

especially the cell-spot.—Band of hindwing almost elongate-rhombiform, extending from SC^2 to near anal angle; a dot in cell.

♀. *Upperside*: spots of forewing white, cell-spot large, but not reaching across cell; two large patches R^3-M^2 , a minute dot before R^3 and sometimes a small streak behind M^2 .—Hindwing: red band almost as in male, anteriorly wider than in that sex, crossing apex of cell, the veins only partly black, the central ones almost entirely red within band; a small spot before SC^2 present or absent.

Underside: band paler than above, the veins for the greater part black.

Hab. Brazil: Sao Paulo.

We have much pleasure in naming this form after Herr J. Foetterle, from whom we have received some useful material of *Papilio*.

In the Triang Museum 3 ♂♂, 3 ♀♀ from Sao Paulo (received from Messrs. Staudinger & Bang-Haas).

36. *Papilio hedae* Foett. (1902).

♀. *Papilio hedae* Foetterle, *Rev. Mus. Paulista* v. p. 620, t. 15, fig. 1 (1902) (S. Paulo).

The figure gives one the impression of the unique specimen being an abnormal individual of *P. anchises foetterlei*. However, it is impossible to be certain on this point without comparing the specimen with a series of females of *foetterlei*. If it is, as we suppose, an aberration, the individual will doubtless remain unique for a long time.

The forewing is buffish white from inner margin forward to near R^2 , the inner edge of this broad band entering cell just proximally of M^2 , a large semicircular cell-spot forming part of the band; on the *underside* the band wider and reaching close to costal margin, its distal edge irregular. A pale red band on hindwing gradually shading off into grey, the grey scaling nearly extending to base on *underside*.

Hab. Interior of Sao Paulo.

37. *Papilio nephalion* Godt. (1819).

- ♀. *Papilio nephalion* Godart, *Enc. Méth.* ix. p. 37. n. 36 (1819) (Brazil); Lucas, *Lép. Exot.* p. 29. t. 14. fig. 3 (1835) (Brazil); Boisd., *Spec. Gén. Lép.* i. p. 294. n. 124 (1836) (Brazil); Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vii. p. 47 (1838); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 199 (1846) (Brazil); id., *List Lep. Ins. Brit. Mus.* i. App. p. 147 (1848); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 5. n. 77 (1857) (Brazil).
- ♂. *Papilio vertumnus*, Godart (*non* Cramer, 1782, *err. det.*), *l.c.* p. 37. n. 38 (1819) (*partim*; Brazil); Lucas, *Lép. Exot.* p. 13. t. 7. fig. 2 (1835) (Brazil); Ménétr., *l.c.* n. 78 (1857) (Brazil).
- ♂. *Priamides osymonduus* Hübner, *Samm. Exot. Schneit.* iii. t. 27. (1834?) (Brazil).
- ♂. *Papilio proteus* Boisduval, *Spec. Gén. Lép.* i. p. 297. n. 128 (1836) (Brazil); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 12 (1845) (Brazil).
- ♀. *Papilio tullus*, Doubleday (*non* Cramer, 1780, *err. det.*), *List Lep. Ins. Brit. Mus.* i. p. 12 (1845) (Brazil); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 201 (1846) (*partim*; Brazil; ♂ = *proteus*).
- ♂. *Papilio stilbon* Kollar, *Ann. Wien. Museum* ii. p. 215. t. 12. fig. 1 (1839) (Brazil); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 357 (1861).
- ♂ ♀. *Papilio proteus*, Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 46. n. 233 (1852) (Brazil; *stilbon* is var.); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 62. n. 246 (1856) (Brazil; Rio Grande do Sul); Bates, *l.c.* p. 341, 356 (1861) (Rio); Prillw., *Stett. Ent. Zeit.* xxvi. p. 130 (1865) (Corcovado); Capronn., *Ann. Soc. Ent. Belg.* xvii. p. 8. n. 4 (1874) (Gavia, August).
- ♀. *Papilio proteus* var. b. *Papilio nephalion*, Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 47. sub n. 233. t. 10*. fig. 8 (1852) (Brazil).

- ♂ ♀. *Papilio nephalion*, Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 293. n. 51 (1864) (Southern Brazil); Kirby, *Cat. Diurn. Lep.* p. 527. n. 62 (1871) (Brazil); Weym., *Stett. Ent. Zeit.* lv. p. 315. n. 9 (1895) (Rio Grande do Sul); Mabilde, *Guia Pract. Borbol. Rio Grande do Sul* p. 44 (1896); Bönningh., *Verh. Ver. Nat. Unterh.* ix. p. 27 (1896) (Rio de Janeiro; rather common).
- ♂. *Papilio nephalion* ab. ? ♂ *P. haemon* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 293. sub n. 51. p. 336 (1864) (Mus. Vienna).
- ♂ ♀. *Papilio vertumnus*, Burmeister, *Descr. Rép. Argent. v. Léop., Atlas* p. 7. n. 16 (1879) (larva, pupa; Rio de Janeiro to Santa Catharina; synonym. *partim*); Seitz, *Stett. Ent. Zeit.* liv. p. 18 (1893) (Santos).
- ♂. *Papilio osmandryas* (!), Burmeister, *l.c.* (1879) (sub syn.).
- ♀. *Papilio nephaleon* (!), Bönninghausen, *l.c.*
- Endopogon nephalion*, Kirby, in Hübn., *Samm. Exot. Schm. ed. ii.* p. 88. t. 465. fig. 3. 4 (190-?).

In structure practically the same as *P. anchises*, but very different in colour from the Brazilian form of that insect.

♂. The creamy patch of the forewing large, consisting of two or three spots, spot M^1 — M^2 being the largest, the patch extending occasionally to near SM^2 , sometimes only spot M^1 — M^2 distinct; some specimens with a minute dot in cell. —Hindwing usually with three spots R^2 — M^2 , rarely with two only, often an additional spot SC^2 — R^1 marked, but apparently never a spot R^1 — R^2 ; tooth R^3 prominent.

On *underside* the three spots R^2 — M^2 of hindwing pinkish white, their distal portions remaining red; two red spots between M^2 and anal angle, usually confluent, and a spot SC^2 — R^1 , the latter often vestigial.

♀. Forewing with or without cell-spot; a patch of two or three discal spots, spot M^1 — M^2 the largest. —Hindwing: red band from R^2 to abdominal margin, consisting of five spots, the last two being usually confluent; most specimens with an additional spot SC^2 — R^1 , while in some others there is also a dot R^1 — R^2 ; rarely spot R^1 — R^2 present and SC^2 — R^1 absent.

On *underside* there is apparently always a cell-spot on forewing. —The hindwing bears always a spot SC^2 — R^1 , while spot R^1 — R^2 is rarely marked; spots R^2 — M^2 are rather large, sometimes spot R^3 — M^1 touching cell, but there is never a dot in cell; colour of these spots as in ♂.

Early stages described by Burmeister, *l.c.*

Hab. Brazil; Matto Grosso; Paraguay and adjacent districts of Argentina.

In the Tring Museum 40 ♂♂, 32 ♀♀, from: Minas Geraës (A. Kennedy); Rio de Janeiro; Organ Mts., Sarapuhy, and Corcovado; Sao Paulo; Castro, Parana (E. D. Jones); Hajahy, S. Catharina, February 1897; Yhu, Paraguay, September—December 1896 (Audeer); Sapucay, Paraguay, October, December, and January (W. Foster).

III. Lysander Group.

Marginal spots of hindwing red. Palpus always black. Hindtibia of male incrassate, hairy, foretibia not enlarged, spinose as in female. Harpe long, reaching close to apex of clasper, truncate, with two to five apical spinelike teeth, ventral edge non-dentate or minutely denticulate, never with a prominent conical tooth as in most species of the *Aeneas* Group. Anal segment of female without the short stout spinelike bristles of the *Belus* Group; in the vaginal cavity, on the proximal side, two broadly triangular lobes close together, these lobes pointing proximad when the walls of the cavity are pushed outside.

Key to the species :—

- A. Vein M^2 of hindwing branching off from cell far beyond SC^2 , the cell being asymmetrical.
- a.* Forewing without markings in both sexes, except the red or pinkish white marginal dots ; an evenly curved row of red spots on hindwing about halfway between cell and distal margin Species No. 38.
Forewing with blue or bluish green band in male ; in female with or without white patches, no distinct fringe-spots, or the fringe not indented between the veins ; red band of hindwing not regularly arched, the spots closer together and less regularly ovate than in Species No. 38 *b.*
- b.* ♂ without white wool in fold of hindwing ; ♀, distal margin of forewing straight, last two spots on hindwing on a level with one another, usually confluent Species No. 41.
♂ with white wool in fold of hindwing ; ♀, distal margin of forewing rounded, last two spots of hindwing not on a level *c.*
- c.* ♂, band of forewing oblique, strongly tapering, patch M^2 — SM^2 obliquely truncate proximally ; ♀, apical half of forewing semi-transparent, distal margin feebly rounded, tooth R^3 of hindwing usually prominent Species No. 40.
♂, band of forewing more straight, patch M^2 — SM^2 square, one or two white spots on disc ; ♀, apex of forewing more opaque than in No. 40 ; distal margin more convex, hindwing more rounded Species No. 39.
- B. Veins SC^2 and M^2 of hindwing almost at the same distance from base, the cell being nearly symmetrical.
- d.* ♂, midtibia densely covered with small hairs ; ♀, forewing with broad white subapical cell-patch, or with two rounded spots on disc, in the latter case the red band of hindwing always entering cell *e.*
♂, midtibia spinose like foretibia, cell of hindwing red on upperside (base excepted), or the forewing with large white patches ; ♀, no spot in cell, or only a small one, band of hindwing outside cell *f.*
- e.* ♂, forewing with two white spots on disc ; ♀, forewing with a small or no spot Species No. 45.
♂, forewing with one or no white spot on disc ; ♀, forewing with large cell-patch Species No. 44.
- f.* ♂, forewing with large white spots on disc, band blue, cell of hindwing black ; ♀, forewing opaque, or a straight row of three white spots on disc, the upper one being more or less obscure, but no spot in cell Species No. 43.
♂, band of forewing green, cell of hindwing red on upperside ; ♀, apical half of forewing semitransparent, no spots on disc, or small ones, or the spots are large, usually also a streak in cell Species No. 42.

38. *Papilio panthonus* Cram. (1780).

Papilio Eques Trojanus panthonus Cramer, *l.c.* iii. p. 154. t. 278. fig. C. D. ♂ (1780) (Surinam); Esper, *Anst. Schmett.* p. 67. n. 30. t. 16. fig. 4 (1789).
Papilio Eques Trojanus pompeius Fabricius, *Spec. Ins.* ii. *Append.* p. 502 (1781) (nom. nov. loco *panthonus*).

♂ ♀. Sexes similar, but the female paler than the male; fringe of forewing spotted with pale red; hindwing with regularly curved row of red spots situated about halfway between cell and distal margin.

Scent-organ: fold with white wool as in *P. lysander*.

Genitalia: ♂, harpe truncate at apical edge, with about six teeth of nearly equal size.

Early stages not known.

Hab. The Guianas and Brazil.

Two subspecies.

a. *P. panthonus numa* Boisd. (1876).

♀. *Papilio numa* Boisduval, *Spec. Gén. Léop.* i. p. 289. n. 116 (1836) (♀; hab. ?); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 208 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 64. n. 285 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 74. n. 301 (1856) (*partim*); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 361 (1861); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 295. n. 85 (1864) (Surinam; Demerara); Butler, *Cat. Diurn. Lep. descr. Fabric.* p. 237. sub n. 11 (1869) (= *panthonus* ?); Kirby, *Cat. Diurn. Lep.* p. 529. n. 70 (1871); Oberth., *Et. d'Ent.* iv. p. 82. n. 271 (1880) (differences from *panthonus*).

♂. *Papilio jaguaræ* Foetterle, *Rev. Mus. Paulista* v. p. 619. t. 15. fig. 3 (1902) (Minas Geraës; Sao Paulo).

♂ ♀. Differs from the Guiana form in the forewing being rather paler and in the red spots of the hindwing being smaller, and therefore farther apart.

Hab. Interior of Sao Paulo and Minas Geraës, Brazil.

Type (♀) of *numa* in coll. Oberthür.

b. *P. panthonus panthonus* Cram. (1780).

Papilio Eques Trojanus panthonus Cramer, *l.c.* (Surinam); Esper, *l.c.*

Papilio Eques Trojanus pompeius Fabricius, *l.c.*; id., *Mant. Ins.* ii. p. 5. n. 37 (1787).

Papilio Eques Trojanus pompeius, Jablonsky & Herbst, *Naturs. Schmett.* ii. p. 48. n. 19 (1784) (♂); Gmelin, *Syst. Na.* i. 5. p. 2233 n. 295 (1790); Fabr., *Ent. Syst.* iii. 1. p. 18. n. 54 (1793).

Priamides pompeius, Hübner, *Verz. bek. Schmett.* p. 87. n. 904 (1818 ?).

Papilio pompeius, Godart, *Enc. Méth.* ix. p. 36. n. 32 (1819) (*partim*)

Papilio arabes, Boisduval (*non* Cramer, 1782, *err. det.*), *Spec. Gén. Léop.* i. p. 290. n. 118 (1836) (*partim*).

Papilio panthonus Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 64. n. 284 (1852) (*synon. partim*); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 74. n. 302 (1856); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 358 (1861); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 295 n. 87 (1864); Kirby, *Cat. Diurn. Lep.* p. 528. n. 69 (1871) (Guiana; *synon. partim*); Oberth., *Et. d'Ent.* iv. p. 82. n. 272 (1880) (Guyane).

Papilio aeneas, Butler (*non* Linné, 1758, *err. det.*), *Cat. Diurn. Lep. descr. Fabric.* p. 236. n. 11 (1869) (*partim*; ♀).

Papilio santhonus (!), Möschler, *Verh. Zool. Bot. Ges. Wien* xxvii. p. 295 (1876) (Surinam).

Papilio phylarchus Hopffer, *Stett. Ent. Zeit.* xxvii. p. 24. n. 3 (1866) (Cayenne).

♂ ♀. The red spots of the hindwing variable in size, but apparently never so small as in the Brazilian form. The fringe-spots of the forewing are sometimes nearly pure white; in other specimens they are represented only by a very few rosy scales.

Hab. The Guianas.

In the Tring Museum 7 ♂♂, 5 ♀♀, from : Bartica, British Guiana, February 1904; Paramaribo, February 1892 (Ellacombe); New Amsterdam.

39. *Papilio aglaope* Gray (1852).

- (2) *Papilio Eques Trojanus curisteus* Cramer, *Pap. Exot.* i. p. 47. t. 29. fig. F (1775) (Surinam; this species?).
- (?) *Papilio curisteus*, Boisduval, *Spec. Gén. Léop.* i. p. 282. n. 107 (1836); Kirby, *Cat. Diurn. Lep.* p. 528. n. 68 (1871).
- ♂. *Papilio aglaope* Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 55. n. 260. t. 10. fig. 5. ♂ (1852) (Pará; *partim*, ♀ *alia species*); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Amazons, forest); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* 67. n. 275 (1856) (*partim*); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 343, 358 (1861) (Pará; only two ♂♂ known); id., *Journ. Entom.* i. p. 226. n. 19 (1862) (Pará, rare); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 295. n. 83 (1864) (Pará); Kirby, *Cat. Diurn. Lep.* p. 528. n. 67 (1871).
- ♀. *Papilio erlaces* Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 49. n. 240. t. 8. fig. 10 (1852) (Bolivia; ♂ *alia species*); id., *Lep. Ins. Brit. Mus.* i. *Pap.* p. 63. n. 253 (1856) (*partim*).
- ♀. *Papilio callicles* Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 361 (1861) (nom. nov. pro *erlaces* ♀); Feld., *l.c.* p. 295. n. 86 (1864); Kirby, *l.c.* p. 529. n. 70 (1871); Hopff., *Stett. Ent. Zeit.* xl. p. 50. n. 6 (1879) (Bolivia).
- ♂♀. *Papilio lysimachus* Honrath, *Berl. Ent. Zeitschr.* xxxii. p. 251. t. 5. fig. 5. ♂, fig. 6. ♀ (1888) (Southern Peru).

We believe Cramer's figure of *curisteus* to represent a specimen of this species. But as the figure is very rough, and as, further, the species is not known from Surinam, we are not certain that our identification is correct. For this reason we treat the name *curisteus* as of doubtful application, and accept Gray's name *aglaope* for the present insect.

♂. Forewing shorter, its distal margin more convex than in *P. lysander*; bluish green band more straight, patch M^2-SM^2 square; a large white spot M^1-M^2 in band, generally a second spot R^3-M^1 ; fringe usually with small red spots.—Hindwing: a row of four red spots, which are much shorter than in *P. lysander*, being separate from cell; sometimes a minute fifth spot before R^1 .

♀. Resembling closely the white-spotted female of *lysander*. Apical area of forewing less transparent, apex broader, distal margin more convex; hindwing more evenly rounded.

There are two forms, one which resembles the male in the position of the spots of the forewing, and the other resembling *P. lysander* ♀-f. *parsodes*.

a¹. ♀-f. *lysimachus* Hour., *l.c.*—Forewing with three spots in a straight row, spot M^2-SM^2 greenish, small, spot M^1-M^2 white, rounded, a little longer than broad, spot R^3-M^1 white, shaded with brown, narrow, situated along M^1 .

b¹. ♀-f. *callicles* Bates, *l.c.*—Forewing with large white patch M^1-M^2 , a smaller patch R^2-M^1 and a streak in cell.

Scent-organ as in *P. lysander*.

Hab. of *P. aglaope*: Lower Amazons; Southern Peru; East Bolivia.

In the Tring Museum 3 ♂♂, 2 ♀♀, from : Igarapé (W. Hoffmanns); Pará (Stuart); Province Sara, Santa Cruz de la Sierra, Bolivia, February—April 1904 (J. Steinbach).

40. *Papilio lysander* Cram. (1775).

Seba, *Thesaur.* iv. p. 12. t. 7. fig. 27. 28. ♀ (1764).

- ♂. *Papilio Eques Troes lysander* Cramer, *Pap. Exot.* i. p. 46. t. 29. fig. C. D. (1775) (Surinam); Goeze, *Ent. Beytr.* iii. 1. p. 36. note (1779) (var. of *aeneas*); Esper, *Aust. Schmett.* p. 62. n. 27. t. 16. fig. 1 (1788) (fringe-spots of hindwing white in figure!).

- ♀. *Papilio Eques Trojannus anchises*, Fabricius (non Linné, 1758, err. det.), *Syst. Ent.* p. 446. n. 19 (1775) (*partim*); Sulzer, *Gesch. Schmett.* i. p. 141. ii. p. 24. n. 4. t. 12. fig. 4 (1776) (forewing with white patches); Goeze, *l.c.* p. 34. n. 11 (1779) (*partim*); Fabr., *Spec. Ins.* ii. p. 7. n. 26 (1781) (*partim*); Gronov., *Zoophylac.* p. 188. n. 727 (1781) (*partim*); Esper, *l.c.* p. 13. n. 11. t. 6. fig. 1 (1785); Fabr., *Mont. Ins.* ii. p. 4 n. 28 (1787) (*partim*); Roem., *Gen. Ins.* p. 68. t. 12. fig. 4 (1789); Gmelin, *Syst. Nat.* i. 5. p. 2230. n. 11 (1790) (*partim*); Fabr., *Ent. Syst.* iii. 1. p. 13. n. 40 (1793) (*partim*).
- ♀. *Papilio Eques Trojannus arbates* Stoll, in Cram., *Pap. Exot.* iv. p. 198. t. 386. fig. C. D (1782) (Surinam); Jabl. & Herbst., *Naturs. Schmett.* ii. p. 41. u. 17. t. 9. fig. 4 (1784); Esper, *Jusl. Schmett.* p. 55. n. 23. t. 14. fig. 1 (1788).
- ♂. *Papilio Eques Trojannus meleander* Jablousky & Herbst., *Naturs. Schmett.* ii. p. 75. n. 23. t. 10. fig. 2 (1784) (nom. nov. loco *lysander* Cram.).
- ♂. *Papilio Eques Trojannus aeneas*, Esper (non Linné, 1758, err. det.), *l.c.* p. 40. n. 15. t. 9. figs. 1 (1786) (syn. excl.); Gmelin, *Syst. Nat.* i. 5. p. 2233. n. 16 (1790) (*partim*).
- P. arbates* (!), Goett., *Gelchrte Anz.* 40. Stück p. 400 (1790).
- ♀. *Priniceps dominans arbates*, Hübn., *Samml. Exot. Schmett.* i. t. 123. fig. 3. 4 (1806—).
- ♀. *Priniceps dominans pompejus*, id. (non Fabricius, 1776, err. det.), *l.c.* i. t. 124. fig. 3. 4 (1806—) (fringe-spots of hindwing white in fig. 4, error in colouring).
- ♂. *Priniceps dominans lysander*, id., *l.c.* t. 127. fig. 1. 2 (1806—).
- ♀. *Priamides anchises*, id. (non Linné, 1758, err. det.), *Verz. bek. Schmett.* p. 87. n. 902 (1818?) (*partim*).
- ♀. *Priamides brissonius* id., *l.c.* p. 87. n. 903 (1818?) (nom. nov. loco *pompejus* Hübn.).
- ♂. *Parides lysander*, id., *l.c.* p. 87. 910 (1818 ?).
- ♂. *Papilio eurymas* Godart, *Enc. Méth.* ix. p. 34. n. 27 (1819) (nom. nov. loco *lysander* Cram.; Guyane); Boisduval, *Spec. Gén. Léop.* i. p. 284. n. 110 (1836) ("var." discoloured specim.; Cayenne; Surinam); Kollar, *Denkschr. K. Ak. Wiss. Wien, Math. Nat. Cl.* i. p. 352. n. 3 (1850) (Las Palmas, Nova Granada).
- Papilio anchises*, Godart, *Enc. Méth.* ix. p. 36. n. 31 (1819) (*partim*); Guen., *Ann. Soc. Ent. France* p. 309 (1867) (Sulzer's fig. of *anchises* represents *dimus* = ♀ of *zucynthus*, error); id., *l.c.* p. 309 (1867) (Esper's fig. of *anchises* represents *arbates*, = ? *panthous*); Bail., *Cat. Diurn. Lep. descr. Fabr.* p. 235. n. 7 (1869) (*partim*); Kirby, *Cat. Diurn. Lep.* p. 529. n. 74 (1871) (*partim*); Müschl., *Verh. Zool. Bot. Ges. Wien* xxvii. p. 295. (1876) (*partim*; Surinam; = *lysander* = *arbates* = *eurymas*); Staud., *Exot. Tuff.* i. p. 14. t. 9. ♂ ♀ (1884); Hahnel, *Iris* iii. p. 275 (1890) (Sao Paulo de Olivença).
- Papilio lysander* (!), Swainson, *Zool. Illustr.* iii. text of t. 92 (1823).
- ♀. *Papilio arbates*, Boisduval, *Spec. Gén. Léop.* i. p. 290. n. 118 (1836) (*partim*; his ♂ is ♀); Kollar, *Denkschr. K. Ak. Wiss. Wien, Math. Nat. Cl.* i. p. 353. n. 5 (1850) (Venezuela).
- Papilio panthous*, Doubleday (non Cramer, 1780, err. det.), *List Lep. Ins. Brit. Mus.* i. p. 12 (1845) (*partim*); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 19. n. 225 (1846) (*partim*).
- ♂ ♀. *Papilio lysander*, Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 53. n. 254 (1852) (Demerara); id., *List Lep. Ins. Brit. Mus. i. Pap.* p. 66. n. 269 (1856); Ménétr., *Evnu. Corp. Anim. Mus. Petrop., Léop.* i. p. 5. n. 79. 83 (1857) ("Brazil"); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 343 (1861) (variability); id., *Journ. Entom.* i. p. 226. n. 20 (1862) (typ. form in Guiana and Upper Amazons as far down as Villa Nova; local form *parsoles* at Pará); id., *Natural. Riv. Amaz.* p. 26 (1864) (Pará, ♂ in swampy shades, ♀ in more open places); id., *l.c.* p. 156 (1864) (*lysander* replaces *parsoles* on the Upper Amazon); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 295. n. 93 (1864) (Surinam; Guaoa; Cayenne; Amazonia inf.; "Brasilia?"); Oberth., *Et. d'Ent.* iv. p. 91. n. 285 (1880) (Guyane).
- ♂ ♀. *Papilio brissonius*, Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 53. n. 255. t. 8. fig. 7. ♂ (1852) (Ega); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 256 (1854) (Upper Amazon; forest); Gray, *List Lep. Ins. Brit. Mus. i. Pap.* p. 66. n. 270 (1856) (Ega; Villa Nova); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 295. n. 92 (1864) (Ega; Orinoco).
- ♂ ♀. *Papilio parsoles* Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 54. n. 256. t. 8. fig. 3. ♂ (1852) (Pará; *partim*; ♀ *alia spec.*); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Pará; forest); Gray, *List Lep. Ins. Brit. Mus. i. Pap.* p. 66. n. 271 (1856) (Pará; Villa Nova); Bates, *Natural. Riv. Amaz.* p. 156 (1864) (replaces *lysander* in the Delta region); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 295. n. 91 (1864) (Pará; Tocantins; "Mexico?"); Oberth., *Et. d'Ent.* iv. p. 92. n. 286 (1880) (Pará; geogr. form of *lysander*); Sharpe, *Proc. Zool. Soc. Lond.* p. 555. n. 3 (1890) (Prov. Goyaz).
- ♀. *Papilio sonoria* Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 57. n. 263 (1852) (nom. nov. loc. "*anchises* Sulz."; Pará); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 256 (1854) (Pará; forest); Gray, *List*

- Lep. Ins. Brit. Mus. i. Pap.* p. 68. n. 278 (1856) (Pará); Butl., *Trans. Ent. Soc. Lond.* p. 145. n. 224 (1877) (♂, R. Tapajos, March).
- ♀. *Papilio sonoria* var. *a.*, Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 57. sub n. 263 (1852) (Pará).
- ♀. *Papilio anaximander* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 295. n. 89 (1864) (*nom. nud.*, hab. ?); id., *Reise Novara, Lep.* p. 32. n. 21. t. 18. fig. b (1865) (hab. ?—Mus. Tring); Kirby, *Cat. Diurn. Lep.* p. 529. n. 73 (1871).
- ♂. *Papilio phrynichus* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 295. n. 90 (1864) (*nom. nud.*; Nova Granada); id., *Reise Novara, Lep.* p. 33. n. 22. t. 8. fig. e (1865) (Las Palmas, N. Grauada;—Mus. Vienna).
- ♂. *Papilio lysander* var. *bari* Oberthür, *Et. d'Ent.* iv. p. 91. sub n. 285 (1880) (patch of hindwing orange).
- Papilio anchises* var. *parsodes*, Möschler, *Verh. Zool. Bot. Ges. Wien* xxxii. p. 304. (1883) (Surinam).
- ♀. *Parides arbates*, Kirby, in Hubn., *Samml. Exot. Schneit.* ed. ii. p. 90. t. 123. fig. 3. 4 (190—?).
- ♂ ♀. *Parides brissonius*, id., *l.c.* p. 90. t. 124. fig. 3. 4, t. 127. fig. 1. 2 (190—?).

The considerable series of specimens we have compared appears to prove that the species is not split up into well-defined geographical races, in spite of the large area it occupies. The males at least do not show any reliable differences in the various districts. However, there is something geographical in the variability of the other sex, in one place the one female form being prevalent or occurring alone, while in another district another form is more commonly met with. According to the females the area inhabited by *P. lysander* can be divided into three districts:

(a) Eastern portions of Colombia, Ecuador and Peru, and the Upper and Middle Amazons. In this district the females have no white spots on the forewing or only traces of them.

(b) The Lower Amazons, south side of the river. Here the females have always a large white patch consisting of several spots.

(c) The Guianas (and probably the north side of the Lower Amazons). The females agree either with (a) or with (b), or are intermediate. In Surinam the larger proportion of the females are without white patch or have only a round spot M^1-M^2 , while in British Guiana the majority of females have as large a white patch as the Pará specimens.

Gray, *l.c.*, and also Bates, *l.c.*, said that the Pará males have a larger green band on the forewing than those from other places. This distinction does not hold good.

♂ ♀. Intermediate between *P. echemon* and *aglaope*, the main differences being stated under these species. Linné's *Papilio anchises* is quite a different insect. The earlier writers treated all the males of the species of this group marked green and red as being specifically the same.

P. lysander is the first name given to the present species. Gray correctly assigned the name of *lysander* to Guiana specimens of this insect. But Kirby in his *Catalogue* enumerated the species again as *anchises* L. In a ♂ in coll. Oberthür the patch of the hindwing is orange instead of red (ab. *bari*).

In order to facilitate reference the females may be grouped in three individual forms:

a. ♀-f. *parsodes* Gray, *l.c.*; *sonoria* id., *l.c.*—Forewing with large white patch consisting of several spots; besides a large spot M^1-M^2 there being a spot R^3-R^1 , another behind M^2 , and often a small spot in cell.

b. ♀-f. *arbates* Stoll, *l.c.*; *anaximenes* Feld., *l.c.*—Forewing with a single, more or less rounded, spot M^1-M^2 . In type of *anaximenes* the red spots of the hindwing are faded, except the upper two.

c. ♀-f. *brissonius* Hübner, *l.c.*; *pompejus* id., *l.c.* (*non* Fabricius, 1787, *err. det.*).—Forewing without distinct white spot.

Early stages not known.

Hab. of *P. lysander*: The Guianas; Amazons from Pará to Peru and Ecuador; "Bogota."

In the Tring Museum 38 ♂♂, 45 ♀♀, from: Bartica, Brit. Guiana, February 1902; Rio Demerara; Fort Akayma; New Amsterdam; Upper Real Berbice R.; Berg-en-Daal, May 1892 (Ellacombe); Surinam; Tefé, January 1905 (Mathan); Juhuty, April 1905 (Mathan); Maués; Itaituba; Iquitos (Stuart); R. Jurúá; Igarapé (W. Hoffmanns); Pará (Stuart); Archidona, E. Ecuador (R. Haensch).

41. *Papilio echemon* Hübn. (1806—).

Prinsep dominans echemon Hübn., *Samml. Exot. Schmett.* i. t. 121. fig. 3. 4. ♀ (1806—).

Prinsep (!) dominans echelus id., *l.c.* t. 126. fig. 1. 2. ♂ (1806—).

The male of this species is easily distinguished from that of *P. lysander*. The females of the two insects come often very near one another, but can be separated by the differences hereafter mentioned.

♂. Apex of eighth abdominal segment less extended red than in *P. lysander*. Forewing narrower, apex more acute, distal margin concave, the blue-green spot situated behind SM^2 small, not produced basad into a point; underside with cyaneous gloss posteriorly; scales of upper layer in apical area of upperside bidentate, those of under layer tridentate, the teeth being short; on underside the upper scales bi-, the under scales tridentate in apical half of wing, the teeth, though long, being shorter than in *P. lysander*.—Hindwing with cyaneous gloss above, especially along abdominal fold; scales of upperside in distal area nearly all denticulate, the larger portion of the red patch included; tooth R^3 longer than in *P. lysander*.

♀. Apex of seventh and eighth abdominal segments less extended red than in *P. lysander* female, the red scaling usually restricted to a postvaginal spot. Forewing narrower than in *P. lysander* ♀, distal margin less convex, being straight from SC^5 to SM^2 .—Hindwing: tooth R^3 prominent, anal angle produced, last two red spots M^2 — SM^2 on a level with one another, usually not separate, forming a transverse bar either above or below or on both sides, while in *P. lysander* the two spots are separate, the posterior one being more distal than spot M^2 —(SM^1), the oblique position towards each other being especially obvious on underside.

Neuration: Apex of cell of forewing narrower than in *P. lysander*, cross-veins D^1 and D^2 less oblique; D^3 of hindwing usually much shorter than D^4 .

Scent-organ: edge of fold with a fringe of long hairs; no wool in the fold, the surface of the fold being occupied by densely packed, lanceolate scales, which have a cyaneous gloss.

Genitalia: ♂. Harpe as in *P. lysander* with several teeth at apex, the tooth situated at the ventral angle being the longest.

Early stages not known.

Hab. The Guianas and Lower and Middle Amazons.

Two subspecies:

a. *P. echemon echemon* Hübn. (1806—).

- ♀. *Princeps dominans echemon* Hübner, l.c.
 ♂. *Princeps dominans echelus* id., l.c.
 ♀. *Priamides echemon* id., *Verz. bek. Schmett.* p. 87. n. 898 (1818?).
 ♂. *Parides echelus* id., l.c. n. 907 (1818?).
 ♂. *Papilio echelus*, Boisduval, *Spec. Gén. Léop.* i. p. 287. n. 113 (1836) ("Amer. mér.", descr. from Hübner's fig.).
 ♀. *Papilio polymetus*, id. (non Godart, 1819, err. det.), l.c. p. 283. sub n. 108 (1836) (*partim*; = *echemon* Hübn.).
 ♀. *Papilio spartacus* Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 206 (1846) (*nom. nud.*; Brazil; "cit. Doubl." erroneous).
 ♀. *Papilio echelus* var. a. *Papilio spartacus* Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 55. sub n. 257. t. x*. fig. 1 (1852) (Brazil); id., *List Lep. Ins. Brit. Mus. i. Pap.* p. 67. sub n. 272 (1856); Kirby, *Cat. Diurn. Lep.* p. 530. sub n. 75 (1871) (Brazil).
 ♂ ♀. *Papilio echelus* Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 120 (1846); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 54. n. 257 (1852) (*syn. partim*; Pará); Wall., *Trans. Ent. Soc. Lond.* (2), ii. p. 255 (1854) (Amazons; forest); id., *List Lep. Ins. Brit. Mus. i. Pap.* p. 67. n. 272 (1856) (*syn. partim*; Pará; Saotarem; Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petrop., Léop.* i. *Suppl.* p. 68. n. 1130 (1857) (Pará); Bates, *Trans. Ent. Soc. Lond.* (2), v. p. 344 (1861) (Lower Amazons); id., *Journ. Ent.* i. p. 227. n. 21 (1862) (Pará and south shore of Amazon as far as Santarem, nowhere else); Reak., *Proc. Ent. Soc. Philad.* ii. p. 138. n. 7 (1863) ("Nicaragua" false); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 94 (1864) (Pará; "Nicaragua" error); Bates, *Natural. Riv. Amaz.* p. 160 (1864) (only on south side of Amazon).
 ♂ ♀. *Papilio echelus* Kirby, *Cat. Diurn. Lep.* p. 530. n. 75 (1871) ("var. c." excl.); Oberth., *Et. d'Ent.* iv. p. 93. n. 287 (1880) (Pará); Staud., *Exot. Tagf.* i. p. 14 (1884) (Lower Amazons); Maass & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 89. n. 43 (1890) (Baião, Lower Amazons); Haase, *Untersuch. Mimicry* i. p. 79 (1893).
Papilio anchises ♀ var. *parvodes*, id., l.c. ii. p. 60. t. 10 fig. 72. ♀ (1893).
 ♂ ♀. *Parides echemon*, Kirby, in Hübn., *Samml. Exot. Schmett.* ed. ii. p. 91. t. 121. fig. 3, 4, t. 126 fig. 1. 2 (190—?).

♂. Bluish green band of forewing narrow, tapering, extending from hind-margin to R^2 , separated from cell.

♀. Forewing with band of white patches, separated from cell, tapering in front, reaching from SM^2 forward to R^2 , sometimes being vestigial as far as R^2 or even beyond; patch M^2 — SM^2 as a rule square or almost, larger than patch M^1 — M^2 ; often a bluish grey streak behind SM^2 . Posterior red (double) patch of hindwing, above, large.

Hab. Lower Amazons, southern side as far upwards as Santarem.

In the Tring Museum 16 ♂♂, 5 ♀♀, from: Igarapé (W. Hoffmanns); Santarem.

b. *P. echemon ergeteles* Gray (1852).

- ♂ ♀. *Papilio ergeteles* Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 52. n. 252. t. 8. fig. 5. ♂ (1852) (♂ ♀; Amazons); id., *List Lep. Ins. Brit. Mus. i. Pap.* p. 66. n. 267 (1856) (Amazons, ♂); Wall., *Trans. Ent. Soc. Lond.* (2), ii. p. 255 (1854) (Upper Amazons; forest); Bates, l.c. v. p. 344, 359 (1861) (descr. of ♀, north shore of Amazon, westward apparently not beyond R. Negro); id., *Journ. Entom.* i. p. 227. n. 22 (1862) (north side of Amazon from Obydos to Rio Negro); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 99 (1864) (Amazons); Bates, *Natural. Riv. Amaz.* p. 160 (1864) (only on north side of Amazon from Obydos to Rio Negro); Oberth., *Et. d'Ent.* iv. p. 91. n. 284 (1880) (Guyane); Wood, *Ins. Abroad* p. 550. fig. 300 (1883).
 ♂. *Papilio echephron* Bates, *Trans. Ent. Soc. Lond.* (2), v. p. 345 note (1861) (French Guiana); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 98 (1864) (Cayenne).
 ♂. *Papilio echemon* id., l.c. xiv. p. 296. n. 95 (1864) (*nom. nud.*; hab. ?); id., *Reise Novara, Lep.* p. 33. n. 23. t. 8. fig. d (1865) (hab. ?—Mus. Vienna).
 ♂. *Papilio polyphron* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 96 (1864) (*nom. nud.*; Surinam); id., *Reise Novara, Lep.* p. 33. n. 24. t. 8. fig. e (1865) (Surinam).

- ♀. *Papilio pisander* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 295. n. 88 (1864) (*nom. nud.*; *hab.?*); *id.*, *Reise Novara, Lep.* p. 31. n. 20. t. 8. fig. f (1865) (*hab.?*—*Mus. Tring*); Kirby, *Cat. Diurn. Lep.* p. 529. n. 72 (1871); Möschl., *Verh. Zool. Bot. Ges. Wien* xxxii. p. 304 (1883) (Surinam).
Papilio echelus var. a. *P. echion*, Kirby, *Cat. Diurn. Lep.* p. 530, sub n. 75 (1871).
Papilio echelus var. b. *P. polyphron*, *id.*, *l.c.*
Papilio echelus var. e. *P. echephron*, *id.*, *l.c.*
Papilio echelus var. f. *ergeteles*, *id.*, *l.c.*
Papilio echelus, Möschler, *l.c.* xxxii. p. 304 (1883) (Surinam).

♂. Band of forewing wider than in the preceding, usually extending to cell at M^2 , its inner edge being elbowed at this vein, spot R^3-M^1 mostly absent; white dots absent from underside in most specimens, being occasionally present in specimens from the Amazons.—Hindwing: red spots larger than in *echemon*, contiguous, the two middle ones touching cell or nearly, sometimes all four reaching cell, the latter bearing in one such individual (from Antearim, north shore of Lower Amazon) a red dot at apex. Some Amazonian specimens intermediate between the present subspecies and the preceding one.

♀. Dichromatic, the white patches disappearing sometimes.

a. ♀-f. *ergeteles* Gray, *l.c.*; Bates, *l.c.*—Forewing: a large white patch M^1-M^2 , longer than broad, touching cell, preceded by a smaller patch R^3-M^1 , which is usually reduced to a streak or a shadowy spot standing before M^1 , sometimes barely vestigial, a third white spot behind M^2 , narrowed behind, rarely extended to M^2 , having usually the same shape as in Gray's figure 1 on Pl. X* (*spartacus*, see above under subspec. *echemon*).—This is the ordinary form of the female, commonly met with.

b. ♀-f. *pisander* Feld., *l.c.*—Forewing: white patches represented by a few white scales.—There are two females of this form in coll. Felder, no locality being given; we have not seen it in other collections.

Hab. Lower and Middle Amazons, north shore; the Guianas.

The type of *echion*, a male without locality, takes a somewhat intermediate position between typical *echemon* and typical *ergeteles*; the band of the forewing is narrower than in the latter, the red spots of the hindwing, above, are rather shorter, and there are vestiges of white spots on the underside of the forewing.

In the Tring Museum 8 ♂♂, 7 ♀♀, from: Camaria, British Guiana, January 1904 (R. Haensch); Cayenne; Surinam; Onoribo, March 1893 (Ellacombe).

42. *Papilio neophilus* Hübn. (1837).

Seba, *Thesaur.* iv. p. 38. t. 30. fig. 25. 26. ♂ (1864) (marginal spots descr. as being white!).

♂. *Papilio Eques Trojanius aeneas*, Cramer (*non* Linné, 1758, *err. det.*), *Pap. Exot.* iii. p. 155. t. 279. fig. A. B ((1780) (Surinam); Esper, *Aust. Schmett.* p. 40. n. 15. p. 60 (1788).

♂. *Papilio Eques Trojanius aeneides* Esper, *l.c.* t. 15. fig. 3. ♂ (1788) (*non text, non fig.* 4).

♂. *Porides gurgasus* Hübn., *Verz. bek. Schmett.* p. 87. n. 909 (1818?) (*partim*).

♀. *Prionides neophilus* *id.*, *Samml. Exot. Schmett., Beiträge* p. 46. n. 499. fig. 997. 998 (1837) (Surinam).

Papilio aeneides, Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 51. n. 247. t. 9. fig. 8. ♀ (1852); Guénéé, *Ann. Soc. Ent. Fr.* p. 307 (1867); Oberth., *Et. d'Ent.* iv. p. 94. n. 290 (1880) (Trinidad; Guyane; Pará); Stand., *Exot. Tagf.* p. 14 (1884) (Trinidad; Guiana; Amazons).

The early authors considered the male of the present species and the male of *P. aeneas* to be the sexes of one species. Esper is quite emphatic on this point. Like Cramer, he describes this composite species as *aeneas* L. On the

plate, however, the name *aeneides* appears instead. No mention of this new name being made anywhere in the text, we think Esper was not responsible for it, but the engraver of the plate, *aeneides* being perhaps a misspelling of *aeneas*. Anyhow, as the name *aeneides* was proposed for a supposed species of which the "female" had already a name (*aeneas* L.), *aeneides* is a synonym of this older name *aeneas*.*

Hübner introduced for the same two insects the name of *gargasus*. This name, covering exactly the same species as *aeneides*, is a pure synonym of the latter.

The first name given to a specimen of the present species alone is *neophilus*. We employ it accordingly for the entire species. We add that the name *aeneides* on Esper's plate was entirely overlooked or perhaps suppressed by the older authors. Gray introduced it again, erroneously referring it to the Pará form of the present insect.

♂. Cell of hindwing red, except extreme base. The cell-patch and more or less also the bases of the spots around the cell have a purplish appearance, owing to the presence of black scales among the red ones. On the underside, the red area is reduced to a row of spots standing distally of the cell; these spots are pale, the upper scales being white, transparent.

♀. Resembles that sex of *P. lysander* and *aglaope*, but is easily distinguished by the different position of M^2 of the hindwing, this vein originating from cell as much proximally (or nearly as much) as vein SC^2 , the cell therefore being almost symmetrical in *P. neophilus*. From *P. eurimedes*, which has practically the same venation as *neophilus*, the latter is distinguished by the forewing bearing two or three white patches on disc and a streak in cell, or being devoid of white patches, or being intermediate between these extremes; there is never a patch across the cell, as in *areas*.

Genitalia: ♂. Harpe truncate or obliquely rounded, usually with three long apical teeth, sometimes with four, many specimens bearing one or two small additional teeth; sometimes, especially often in Peruvian specimens, there is a row of minute teeth at the ventral edge.

Early stages not known.

Hab. Colombia to Bolivia and Paragnay, the range extending eastwards to Southern Brazil, the Lower Amazons, Trinidad, and to the Guianas; not found in the western districts of Ecuador and Colombia; also not occurring in Brazil from Rio de Janeiro to Pernambuco, being here replaced by *P. zacyntus*.

The subspecies are not very sharply defined in characters. Unlike *P. lysander*, the males from the various faunistic districts are fairly well separated, while the females of some of the geographical races come very close to each other, occasionally overlapping in characters. In the Guianas the female has usually small or no white patches, rarely fairly large ones. On the Upper Amazons and on the eastern slopes of the Andes from Peru to Colombia, the forewing never bears distinctly marked spots, while in Venezuela and Trinidad, on the Lower Amazons, and in Bolivia, Paragnay, Matto Grosso, and Southern Brazil, the white spots are always large. Bates did not meet with the species at the Middle Amazons, but it is hardly likely that it is entirely absent from that district. We have it from the Rio Jurná and Manóos (received from dealers), and Felder described a specimen from the Rio Negro.

* See p. 418.

a. *P. neophilus eurybates* Gray (1852).

- ♀. *Papilio dimas*, Doubleday (non Fabricius, 1793, err. det.), *List Lep. Ins. Brit. Mus.* i. p. 12 (1845) (*partim*).
- ♂ *Papilio eurybates* Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 51. n. 248. t. 9. fig. 1 (1852) ("Bolivia" laps. cal.; Brazil on label of type); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 65. n. 263 (1856); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 101 (1864) ("Bolivia" error loci).
- ♀. *Papilio eupales* Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 56. n. 262. t. x*. fig. 2 (1852) (Brazil); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 68. n. 277 (1856) (Brazil).
- ♀. *Papilio neophilus*, Gray (non Hübner, 1837, err. det.), *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 56. n. 262 (1852) (sub synon.).
- ♂. *Papilio aeneides* local var. *eurybates*, Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 360 (1861) ("Bolivia").
- ♀. *Papilio zacyanthus* var. ♀, Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 360. (1861).
- ♀. *Papilio zacyanthus* ab., Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. sub n. 105 (1864).
- ♂. *Papilio aeneides* var. e. *P. eurybates*, Kirby, *Cat. Diurn. Lep.* p. 531. sub n. 76 a (1871) ("Bolivia," error loci).
- ♀. *Papilio zacyanthus* var. b. *P. eupales*, id., *l.c.* p. 531. sub n. 76 B. (1871).

♂. Forewing rather narrower than in the other subspecies, white spots large. — Hindwing: red spots around apex of cell not shaded with black proximally, except the first and last; at least the two middle ones touching cell on underside, the spots being less reduced than in the other forms. The type of *eurybates* agrees with Brazilian specimens, and bears the locality label Brazil, not Bolivia, as said by Gray.

♀. Forewing slightly narrower than in the other races, usually with two large patches R^3 — M^2 and a cell-streak, but the patches occasionally vestigial. — Hindwing: red band usually wider than in the other forms, touching cell, there being sometimes a minute spot in cell; the spots of underside paler and usually longer than in the other subspecies.

Hab. Sao Paulo; Matto Grosso.

One single specimen (a female) from Sapucay, Paraguay, 60 miles east of Assuncion, has the narrow forewing of this form, but agrees in the red band of the hindwing with the next.

In the Tring Museum 7 ♂♂, 12 ♀♀, from: Baluru, Sao Paulo (Dr. Hempel); R. Bitalha, Sao Paulo; Araras, Matto Grosso; Cuyaba (Andeer); Sapucay, Paraguay (W. Foster).

b. *P. neophilus consus* subsp. nov.

Papilio eurybates, Hopffer (non Gray, 1852, err. det.), *Stett. Ent. Zeit.* xl. p. 50. n. 8 (1879) (Bolivia).

Larger on an average than the preceding.

♂. Forewing: green patch M^2 — SM^2 longer than broad, often bearing a white dot in the upper distal corner; white spot M^1 — M^2 smaller than in *eurybates*, but always very distinct, rounded, spot R^3 — M^1 usually larger than spot M^1 — M^2 , but shaded with black; most specimens with a vestige of a spot R^2 — R^3 . — Hindwing: bases of red discal spots shaded with black like cell-patch, spot R^3 — M^1 often excepted—in one of our numerous specimens hardly any black scales in the red markings, the cell-patch being nearly as pure red as the discal spots; the spots on underside much shorter than in the preceding, standing separate from cell.

♀. Forewing: a large white patch M^1 — M^2 , preceded by another large patch, which is usually somewhat shaded with brown distally; a more or less distinct cell-streak, which is in one of our Mapiri specimens enlarged to a triangular patch which nearly reaches across the cell; most specimens with a small dot behind M^2 , there being also often a small spot marked before R^3 . — Hindwing: band usually

narrower than in the preceding, mostly not touching cell, the spots often well separated from one another.

Hab. Bolivia: Santa Cruz de la Sierra northward to the Beni River.

The individuals from Reyes approach a little the next form.

In the Tring Museum: 27 ♂♂, 20 ♀♀, from: Santa Cruz de la Sierra, January to April 1904 (J. Steinbach); Rio Grande, December 1903 (J. Steinbach); Mapiri; Salinas, Beni R., July 1893 (Stuart); Reyes, Beni R., August 1903 (Stuart).

c. P. neophilus olivencius Bates (1861).

♂♀. *Papilio olivencius* Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 345 (1861) (S. Paulo de Olivença; Bogota); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 102 (1864) (Upp. Amazons; Bogota); Hahnel, *Iris* iii. p. 275 (1890) (Sao Paulo de Olivença).

Papilio aeneides local var. *olivencius* Bates, *l.c.* p. 360 (1861); *id.*, *Journ. Entom.* i. p. 227. sub n. 23 (1862) (S. Paulo de Olivença).

♀. *Papilio anaximenes* Felder, *Wien. Ent. Mon.* vi. p. 65. n. 1 (1862) (Upper R. Negro); *id.*, *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 100 (1864); *id.*, *Reise Novara, Lep.* p. 36. d. 25. t. 7. fig. b. (1865) (Upper R. Negro).

Papilio aeneides var. b. *P. olivencius*, Kirby, *Cat. Diurn. Lep.* p. 531. sub n. 76a. (1871) (Upp. Amazons). *Papilio aeneides* var. d. *P. anaximenes*, *id.*, *l.c.* p. 531. sub n. 76a (1871) (R. Negro).

Papilio aeneides, Obertbür, *Et. d'Ent.* iv. p. 116. n. 290 (1880) (Sao Paulo de Olivença, November); Michael, *Iris* vii. p. 214 (1894) (Sao Paulo de Olivença).

Papilio aeneides var. *eurybates*, Maassen & Weym. (*non* Gray, 1852, *err. det.*), in Stübel, *Reisen S. Amer.*, *Lep.* p. 24. n. 105 (1890) (West side of Cordillera of Bogota); *id.*, *l.c.* p. 79. n. 29 (1890) (N. Peru); Haase, *Untersuch. Mimicry* ii. p. 60. t. 9. fig. 65. ♂ (1893).

♂. Forewing: spot M¹—M² not distinctly white, being much shaded with green and brown; spot R³—M¹ absent or just vestigial.—Hindwing: red discal spots long, shaded with black proximally, small on underside, being separated from cell.

♀. Forewing with vestigial white spot M¹—M² or without trace of such a spot. In the specimen described as *anaximenes* the red spots of the hindwing exceptionally long.

Hab. Upper Amazons, from Sao Paulo de Olivença and Upper R. Negro westwards; eastern slopes of the Andes of Peru and Ecuador, as far north as the Cordillera of Bogota.

In the Tring Museum 40 ♂♂, 32 ♀♀, from: "Bogota"; Villavicencio to Rio Ocoor, January 1897, 350—400 m., dry season (Dr. Bürger); Chanchamayo (W. Hoffmanns; Schunke); La Union, R. Huacamayo, Carabaya, 2000 ft., December 1904, dry season (G. Oekenden); Peréné, March 1900 (Simons); Rio Toro, La Merced, August—September 1901 (Simons); Cumbare; Huallaga; R. Cachyaco, R. Huallaga (Stuart); R. Juruá; Maniós; R. Negro.

d. P. neophilus cebolius subsp. nov.

Papilio aeneides, Gray (*non* Esper, 1788, *err. det.*), *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 51. n. 247. t. 9. fig. 8. ♀ (1852) (Pará; *syn. excl.*); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 256 (1854) (Pará; forest); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 65. n. 262 (1856) (*partim*; Pará; Villa Nova); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 345, 360 (1861) (*partim*; Pará to Obydos); *id.*, *Journ. Entom.* i. p. 227. n. 23 (1862) (Lower Amazons, Tocantins, Guiana); Kirby, *Cat. Diurn. Lep.* p. 530. n. 76a (1871) (*partim*; Lower Amazons); Hahnel, *Iris* iii. p. 240 (1890) (Villabella, Amaz.).

Papilio garyausus, Wallace (*non* Hübn., 1818?, *err. det.*), *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Amazons; forest); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 103 (1864) (*partim*; Pará; Lower Amazons); Butler, *Trans. Ent. Soc. Lond.* p. 145. n. 223 (1877) (Rio Tapajos, March).

♂. Forewing: green patch M^2-SM^2 about as long as broad, rather shorter than in the previous forms; white spot M^1-M^2 very distinct, oblong or elliptical, transverse, spot R^3-M^1 also distinct, transverse, spot R^2-R^3 vestigial.—Hindwing: red discal spots shorter than in the preceding forms, the two middle ones usually not shaded with black proximally, small on underside, and spot M^1-M^2 mostly closer to cell than in the other forms.

♀. Forewing: white patch M^1-M^2 large, touching cell behind base of M^1 , spot R^3-M^1 more or less shaded with brown, projecting as much distad as spot M^1-M^2 (a line touching both spots would be parallel to distal margin of wing), a small streak in cell, often vestigial, a dot behind M^2 (never absent?), and often a patch before R^3 , its distal edge being in a line with the edges of the two patches R^3-M^2 ; the arrangements of the distal spots reminding one of *P. echemon echemon* ♀, *P. zacyanthus polymetus* ♀, and of the ♂ of *P. aglaope*.—Hindwing: red band much narrower than the black distal area between R^2 and M^2 , the middle spots touching cell, on underside at least spot R^3-M^1 close to cell.

Hab. Lower Amazons, from the Tocantins to Obidos.

In the Tring Museum 5 ♂♂, 7 ♀♀, from: Igarapé (W. Hoffmanns); Sautarem; Obidos, October—November 1904 (M. de Mathan); Juhuty, April 1905 (Mathan).

c. P. neophilus neophilus Hübn. (1837).

♂. *Papilio Eques Trojanus aeneas*, Cramer (non Linné, 1758, err. det.), *l.c.* (*partim*; Surinam); Esper, *l.c.* (*partim*).

♂. *Papilio Eques Trojanus aeneides* Esper, *l.c.* (*partim*).

♂. *Priamides gargasus* Hübner, *l.c.* (*partim*).

♀. *Parides neophilus* id., *Saund. Ecot. Schmett., Zutrüge* fig. 997. 998 (1837).

♂. *Papilio aeneas*, Godart, *Enc. Méth.* ix. p. 33. n. 24 (1819) (*partim*, ♂; Guyane); Lucas, *Lép. Ecot.* p. 27. t. 13. fig. 3. ♂ (1835) (Guyane); Boisd., *Spec. Gén. Léop.* i. p. 286. n. 113 (1836) (*partim*, ♂; Surinam; Cayenne); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 12 (1845) (*partim*); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 202 (1846) (*partim*).

♀. *Papilio neophilus*, Gray, *Cat. Lep. Ins. Brit. Mus.* i. Pap. p. 49. n. 239 (1852) ("♂"!, Surinam)

♂. *Papilio aeneides*, id., *l.c.* p. 51. n. 247 (1852) (descr. and fig. excl.).

♂♀. *Papilio aeneides*, Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 345, 360 (1861) (*partim*; Guiana); Kirby, *Cat. Diurn. Lep.* p. 530. n. 76 A (1871) (*partim*; Guiana); Staud., *Ecot. Tagf.* t. 9. ♂♀ (1884).

Papilio gargasus, Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 103 (1864) (*partim*; Surinam; Guiana).

Papilio aeneides var. a. *Priam. neophilus*, Kirby, *l.c.* p. 531. sub n. 73 A (1871).

Papilio euristeus?, Möschler, *Verh. Zool. Bot. Ges. Wien* xxxii. p. 301 (1883) (Paramaribo, ♀♀).

Papilio eurimedes var. *eurybates*, Möschler (non Gray, 1852, err. det.), *l.c.*

Parides aeneas, Kirby (non Linné, 1758, err. det.), in Allen's *Nat. Libr., Lep. Butt.* ii. p. 271. t. 66. fig. 2. ♂ (1896).

♂. Similar to *echolius*, green patch wider; white spots not quite so distinct; red spots of underside of hindwing rather smaller, spot M^1-M^2 farther away from cell.

♀. Forewing: white spots absent, or vestigial, most specimens having two small round spots R^3-M^2 , rarely both patches large (occasionally in British Guiana).—Hindwing: band often distant from cell, third spot the longest; black distal area of upperside wider than in *oliveneus*.

Hab. The Guianas.

In the Tring Museum 19 ♂♂, 10 ♀♀, from: Cayenne; Surinam; Bartica, Brit. Guiana, March—April 1901.

f. P. neophilus parianus subsp. nov.

Papilio aeneides, Oberthür (*nou* Esper, 1788, err. det.), *Et. d'Ent.* iv. p. 94. n. 290 (1880) (*partim*; Trinidad); Staud., *Exot. Tagf.* p. 14 (1884) (*partim*; Trinidad).

(?) *Papilio gargasus*, Kaye (*nou* Hübner, 1818?, err. det.), *Trans. Ent. Soc. Lond.* p. 206. n. 196 (1904) (Trinidad;—this insect?).

♂. Forewing: green patch M^2 — SM^2 longer than broad; white spot M^1 — M^2 large, spot R^3 — M^1 usually larger than M^1 — M^2 , a more or less distinct spot R^2 — R^3 ; green streak at inner margin broad.—Hindwing: red patch less palmate than in the Bolivian form, spot R^3 — M^1 rarely purple at base, the spots paler beneath than in *consus*, R^3 — M^1 close to cell.

♀. Forewing: a large patch M^1 — M^2 , a somewhat smaller one R^3 — M^1 , often a spot R^2 — R^3 and a dot behind M^2 , cell-streak distinct in most specimens.—Hindwing: band more S-shaped than in the other forms, narrow middle spots close to cell above and below, paler beneath than in the Bolivian subspecies, with which this subspecies agrees best.

Hab. Trinidad; Venezuela: Cumana and Orinoco.

In the Tring Museum 55 ♂♂, 50 ♀♀, from: Caparo valley, Trinidad, December 1896 and January and February 1897 (Dr. P. Rendall); Maraval, Trinidad, July 1891; Campo Alegre, Cumana, 1500 ft., April 1899 (André); Patao, Guiria, August 1891; Maipures, Orinoco, December 1898 (Cherrie); Snapure, Caura R., February and March 1899, October 1900 (S. M. Klages); La Vuelta, May 1904, and Corosito, June 1904, Caura R. (S. M. Klages).

43. *Papilio zacyanthus* Fabr. (1793).

♂. *Papilio Eques Trojanns zacyanthus* Fabricius, *Ent. Syst.* iii. 1. p. 15. n. 46 (1793) (Brazil).

♀. *Papilio Eques Trojanns dimas* id., *l.c.* p. 16. n. 47 (1793) (Brazil; cit. *Cram. exceptis*).

♂♀. *Papilio zacyanthus*, Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 211 (1846) (*dimas* ♀ of *zacyanthus*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 105 (1864) (Brazil; ♂ = *polymetus*; ♀ aberr. = *eupales*, error!); Burm., *Descr. Rép. Argent. v. Léop., Atlas* p. 7. n. 17 (1879) (Rio; larva mentioned); Staud., *Exot. Tagf.* i. p. 14 (1884) (Bahia; Rio de Janeiro).

♂. Forewing with greenish blue patch and at least two white spots. Red band of hindwing separate from cell or contignous with it, no red spot in cell or only a minute one. Midtibia spinose as in *P. neophilus*.

♀. Very close to certain females of *P. neophilus*; either the white spots of forewing more or less rounded and no spot in cell, or spot M^1 — M^2 oblong, large, and a sharply defined spot in cell; band of underside of hindwing paler pink than in *neophilus*, there being hardly any black scales in the band.

Scent-organ and genitalia as in *P. neophilus*.

Early stages mentioned by Burmeister, *l.c.*

Hab. Brazil, from Rio de Janeiro to Pernambuco.

In the district where *zacyanthus* occurs *P. neophilus* is not found. The two insects are so closely related that it is quite possible there exists an intermediate form, perhaps in Goyaz, where the Brazilian and Amazonian faunae meet. Of the two subspecies of *P. zacyanthus* the more northern one agrees better with *P. neophilus* than the southern one.

a. P. zacyanthus polymetus Godt. (1819).

Papilio polymetus Godart, *Enc. Méth.* ix. p. 35. n. 28 (1819) (♂, Brazil; "Peru," error); Swains., *Zool. Illustr.* iii. t. 92. ♂♀ (1823) (Bahia; var. excl.); Lucas, *Lép. Exot.* p. 10. t. 6. fig. 1 (1835) (fig. mala? hacc subsp. ?); Boisdu., *l.c.* p. 283. n. 108 (1836) (*partim*); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 212 (1846) (cit. Hübner, excl.); Oberth., *Et. d'Ent.* iv. p. 93. n. 288 (1880) (Brazil).

- Papilio dimas*, Godart, *l.c.* p. 36. n. 33 (1819) (*partim*).
- Papilio zacyanthus* var. a, *Papilio polymetus*, Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 56. sub n. 261 (1852) (Brazil); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 68. sub n. 276 (1856) (Brazil; "Pará" error loci); Kirby, *Cat. Diurn. Lep.* p. 531. sub n. 76 B (1871).
- Papilio orsilius* Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 57. n. 264 (1852) (Pernambuco); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 68. n. 279 (1856) (Pernambuco; Tapajós); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 346, 360 (1861); id., *Journ. Entom.* i. p. 227. n. 24 (1862) (Pernambuco; Tapajós, not in the Amazonian plains); Feld., *l.c.* n. 104 (1864) (Bahia; Pernambuco; R. Tapajós).
- Papilio zacyanthus* Fabr. var. *polymetus*, Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 346, 360 (1861); id., *Journ. Entom.* i. p. 227. n. 24 (1862) ("Pará," locality doubtful!).
- Papilio polymatus* (!), Guenée, *Ann. Soc. Ent. France* p. 308. note (1867) (= *zacyanthus*; ♀ *dimas*).
- Papilio zacyanthus* var. c. *P. orsilius*, Kirby, *l.c.*
- Papilio zacyanthus*, Grimsbaw, *Trans. Roy. Soc. Edinb.* xxxix. i. No. 1. p. 7 (1897) (in Edinburgh Museum, one of Godart's types).

♂ ♀. Apex of forewing semitransparent; in male spot M^1-M^2 a little smaller, but purer white, than spot R^3-M^1 , separate from cell, rarely a white dot behind M^2 ; in female spot M^1-M^2 a little larger, or at least broader, than spot R^3-M^1 , usually a spot R^2-R^3 , but not cell-spot.

Hab. Pernambuco; Bahia; R. Tapajós.

In the Tring Museum 7 ♂♂ and 3 ♀♀ from Pernambuco and Bahia.

b. *P. zacyanthus zacyanthus* Fabr. (1793).

- ♂. *Papilio Eques Trojanns zacyanthus* Fabricius, *l.c.* (Brazil).
- ♀. *Papilio Eques Trojanns dimas* id., *l.c.* (Brazil).
- ♀. *Priamides hippasan*, Hübner, *Verz. bek. Schmett.* p. 87. n. 906 (1818?) (*partim*).
- ♂. *Papilio zacyanthus*, Godart, *Enc. Méth.* ix. p. 34. n. 25 (1819); Donovan, *Nat. Repos., Ent.* ii. t. 26, 27. fig. 1 (1823) (Brazil); Boisd., *Spec. Gén. Léop.* i. p. 284. n. 109 (1836); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 11 (1845) (cit. Hübn. excl.; Brazil).
- ♀. *Papilio dimas*, Godart, *l.c.* p. 36. n. 33 (1819) (Brazil, *partim*); Donovan, *l.c.* fig. 2 (1823) (Brazil); Lucas, *Léop. Exot.* p. 30. t. 14. fig. 2 (1835); Boisd., *l.c.* p. 292. n. 120 (1836) (Rio de Janeiro; "♀ var. in coll. Roger," probably ♀ *neophilus*); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 12 (1845) (Brazil).
- Papilio polymetus*, Swainson, *l.c.* (1823) (var., Rio de Janeiro).
- ♂ ♀. *Papilio zacyanthus*, Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 211 (1846) (*dimas* ♀ of *zacyanthus*); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 56. n. 261 (1852) (Brazil); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 68. n. 276 (1856) (Brazil); Butl., *Cat. Diurn. Lep. descr. Fabric.* p. 237. n. 12 (1869) (Brazil); Kirby, *Cat. Diurn. Lep.* p. 531. n. 76 b (1871) (Brazilia); Capronn., *Ann. Soc. Ent. Belg.* xvii. p. 8. n. 3 (1874) (Jacarepagua, August); Haase, *Untersuch. Mimicry* i. p. 79 (1893).
- Papilio demas* (!), Doubleday, Westw. & Hew., *l.c.* ii. p. 529 (1852).
- ♂ ♀. *Papilio dimas*, Oberthür, *Et. d'Ent.* iv. p. 93. n. 289 (1880) (Brazil; difference from *polymetus*).
- Papilio zacanthus* (!), id., *l.c.* iv. p. 93. sub n. 289 (1880) (err. cal.).

♂ ♀. Apex of forewing much more opaque than in *polymetus*, the wing altogether deeper black, the spots purer white, spot M^1-M^2 much larger than in *polymetus*, longer than broad, spot R^3-M^1 smaller, in both sexes a white spot behind M^2 , in female a spot in cell, small but sharply defined. Band of hindwing narrower than in *polymetus*.

Hab. Province of Rio de Janeiro.

In the Tring Museum: 3 ♂♂ and 3 ♀♀ from Rio de Janeiro (E. May).

44. *Papilio arcas* Cram. (1781).

- (?) *Papilio Eques Trojanns viridimaculatus* Goeze, *Ent. Beytr.* iii. 1. p. 44. n. 24 (1779) (this species? or *P. aeneas*?—Type: Seba, *Thes.* t. 30. fig. 25. 26. ♂).
- ♀. *Papilio Eques Trojanns arcas* Cramer, *Pap. Exot.* iv. p. 174. t. 378. fig. C (1781) ("Brazil").

- ♂. *Papilio Eques Trojanus eurimedes* id., *l.c.* iv. p. 199, t. 386. fig. E. F (1782) (Berbices).
 ♀. *Papilio eurymedes* (!), Erichson, in Schomb., *F. F. Brit. Guiana* p. 593 (1848) (♀ = *arriphus*).
 ♂ ♀. *Papilio eurimedes*, Kirby, *Cat. Diurn. Lep.* p. 530. n. 76 (1871) ("var. b. *P. timias*" excl.); Oberth., *Et. d'Ent.* iv. p. 95. n. 292 (1880) (synon. *partim*).

♂ ♀. Antenna deeper black than in *P. neophilus*, the sensory grooves, though sharply defined, not so distinct, being black like the rest of the antenna. Mid-tibia much more densely hairy than in *P. neophilus*. Apical half of forewing opaque in both sexes. In male the cell of hindwing red from centre to apex on upperside, the cell-patch being, however, often reduced, sometimes absent, occasionally occupying about three-fifths of cell. In female forewing with a broad white (slightly yellow) patch across cell, a large patch R^3-M^1 on disc, a smaller one R^2-R^3 , and sometimes a small spot behind M^1 . Abdominal fold as in *P. neophilus*.

Genitalia: ♂. Harpe truncate, with two long spinelike teeth at apex, sometimes accompanied by one or two small ones.

Early stages not known.

Hab. Mexico to Colombia, Venezuela and the Guianas.

Seba's figures, on which the name *viridimaculatus* was based by Goeze, are rough. The underside (fig. 26) does not agree with any *Papilio* known. The marginal spots are described as being white. The figure may have been meant for *P. aeneas*, *arcas*, or even *neophilus*.

a. *P. arcas mylotes* Bates (1861).

- ♂ ♀. *Papilio mylotes* Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 64. n. 258 (1856) (*nom. nud.*; Mexico; Nicaragua); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 346. note (1861) (Nicaragua; descr. of ♂ ♀); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863) (Mexico; Central America); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 109 (1864) (Nicaragua; Mexico?; *docimus* ♀ of *mylotes*); Butl. & Druce, *Proc. Zool. Soc. Lond.* p. 364. n. 365 (1874) (Costa Rica); Strecker, *Butt. Moths N. Amer.* p. 68. n. 4 (1878) ("S. California" false; Mexico, Nicaragua, Panama); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 198. n. 13. t. 65. fig. 9. 9A. genit. (1890) (Mexico to Costa Rica).

Papilio docimus Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 64. n. 259 (1856) (*nom. nud.*; Nicaragua); Weidem., *l.c.* p. 147 (1863) (Mexico).

- ♂. *Papilio caleli* Reakirt, *Proc. Ent. Soc. Philad.* ii. p. 138. n. 8 (1863) (Guatemala); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 107 (1864) (Guatemala; *tonila* ♀ of *caleli*?); Strecker, *Lep. Rhop. Het.* p. 15. (1873) ("= *polymetus* Godt."); id., *l.c. Suppl.* iii. p. 17 (1900) (type in coll. Strecker).

♀. *Papilio tonila* Reakirt, *l.c.* p. 140. n. 10 (1863) (Guatemala); Strecker, *l.c.* iii. p. 17 (1900) (type in coll. Strecker).

- ♂. *Papilio alcamedes* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 286. n. 106 (1864) (*nom. nud.*; Nova Granada?); id., *Reise Novara, Lep.* p. 36. n. 26. t. 7. fig. e (1865).

♀. *Papilio aristomenes* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 108 (1864) (*nom. nud.*; Mexico); id., *Reise Novara, Lep.* p. 38. n. 27. t. 7. fig. a (1865).

Papilio eurimedes, Boisduval, *Consid. Léop. Guatem.* p. 6 (1870) (Honduras; Nicaragua; Costa Rica; "Venezuela" alia subspee.; *alcamedes* = *eurimedes*).

Papilio eurimedes var. e. *P. mylotes*, Kirby, *Cat. Diurn. Lep.* p. 530. sub n. 76 (1871) (Nicaragua).

Papilio eurimedes var. d. *P. tonila*, id., *l.c.* (Mexico).

Papilio eurimedes var. e. *P. caleli*, id., *l.c.*

Papilio zueyathus var. *P. polymetus*, id. (*non* Godart, 1819, err. det.), *l.c.* p. 809. n. 76b (1877) (*caleli* = *polymetus*, error).

♂. Forewing: green patch R^3-M^1 long, rarely without white spot; cell usually with green and white spot; no streak at inner margin, patches M^1-SM^2 large.—Hindwing: red spots large, all separate from cell on underside.

♀. Band of hindwing separate from cell above and below, bright red, no spot SC^2-R^1 .

In coll. Charles Oberthür there is a curious aberration of the male, from San Pedro Sula, Honduras. The specimen has a large pale pink patch on the underside of the forewing, the band on the underside of the hindwing being also pale pink.

Hab. Mexico to Costa Rica.

In the Tring Museum: 57 ♂♂, 52 ♀♀, from: Motzorougo, Mexico; Mazatenanga and Retalhuleu, W. Guatemala, 1000 ft., September 1904 (A. Hall); Escuintla, W. Guatemala, 1100 ft., August 1904 (A. Hall); San Pedro Sula, Honduras; Carillo, Costa Rica, 3000 ft., October 1904 (A. Hall); Carillo, June—July 1903 (Underwood); Carthago, Costa Rica (Underwood); San José, Costa Rica, September 1904 (A. Hall); Pozo Azul, Costa Rica, June 1902 (Underwood); Guatit Pirris, Costa Rica, January 1902 (Underwood).

b. P. arcas mycale Godm. & Salv. (1890).

Papilio mycale Godman & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 199. n. 14. t. 65. fig. 12. ♂, 13. ♀ (1890) (Panama: Chiriqui, Bugaba, Lion Hill, Veraguas).

♂. Forewing: green spot R^3-M^1 always present, often with white dot; patch M^1-M^2 large, usually extended close to cell, filling in base of cellule M^1-M^2 ; patch M^1-SM^2 sometimes reduced posteriorly; streak at inner margin present or absent; occasionally a white dot in cell on underside.—Hindwing: cell-spot and bases of discal spots more or less shaded with brown.

♀. Hindwing with or without a small cell-spot, the band deeper red above and below than in the Colombian forms, sometimes separate from cell on underside.

Hab. Northern Panama and the islands off the south coast.

Completely connecting *P. a. mylotes* with *P. a. arriphus*.

In the Tring Museum: 24 ♂♂, 11 ♀♀, from: Chiriqui; Bogava, 800 ft., and Boquete, 3500 ft. (Watson); Brava I., January 1902, and Cebaco I., February 1902 (J. H. Batty); Colon.

c. P. arcas arriphus Boisd. (1836).

- ♀. *Papilio arriphus* Boisduval, *Spec. Gén. Léop.* i. p. 393. n. 123 (1836) (Colombia).
 ♀. *Papilio scrapis*, Doubleday (non Boisduval, 1836, err. det.), in Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 196 (1846) (*partim*; Colombia); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 148 (1863) (*arriphus* ♀ of *scrapis*, false).
 ♂. *Papilio agathokles* Kollar, *Denkschr. K. Ak. Wiss. Wien, Math. Nat. Cl.* i. p. 352. n. 4 (1850) ("R. Orinoko"); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* ii. p. 529 (1852).
Papilio eurimedes, Gray, *Cat. Lep. Ins. Brit. Mus.* i. Pap. p. 50. n. 244 (1852) (*partim*; *arriphus* ♀ of *eurimedes*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 111 (1864) (*partim*); Kirby, *Cat. Diurn. Lep.* p. 530. n. 76 (1871) (*partim*; N. Granada).
Papilio arriphus (!), Weidemeyer, *l.c.*
Papilio arriphus (!), *id.*, *l.c.*
Papilio eurimedes var. *a. P. agathokles* (!), Kirby, *Cat. Diurn. Lep.* p. 530. sub n. 76 (1871).
Papilio eurimedes var. *mylotes*, Staudinger (non Bates, 1861, err. det.), *Exot. Tuff.* p. 14. t. 9. ♂ ♀ (1884).

♂. Forewing: spot R^3-M^1 nearly always distinct, usually isolated, often centred with white.—Hindwing with cell-spot on upperside, not on underside.

♀. Band of hindwing entering cell, pale, its inner edge crossing cell in most specimens just distally of point of origin of M^2 .

Hab. Colombia: Magdalena valley, and R. Meta, east side of Cordillera of Bogota.

The locality given by Kollar for his *agathokles* is doubtless erroneous. The specimen agrees with certain individuals from Colombia in which the patch of the hindwing is very pale. We are the more convinced that *agathokles* came from Colombia, as Kollar records also *Papilio americanus* from the Orinoco, where it is hardly likely to occur, being in Colombia and Venezuela a species of high altitudes. Prince Sulikowsky, who brought these specimens home, went up the Rio Magdalena in Colombia, crossed the Cordillera of Bogota and came down the Rio Meta and Orinoco, which accounts for errors in localisation.

In the Tring Museum 40 ♂♂, 30 ♀♀, from: Valdivia, July 1897 (Pratt); Pacho, November 1898; Muño, November 1896; Purnio, October—November 1896 (Dr. Bürger); Villavicencio.

Very common in "Bogota" collections.

d. P. arcas anthecas subsp. nov.

Papilio agathokles, Maassen & Weym. (non Kollar, 1850, err. det.), in Stübel, *Reisen in S. Amer.*, Lep. p. 36. n. 37 (1890) (La Plata, Canca).

♂. Forewing: green band more or less reduced, no spot before M^1 either above or below.—Hindwing: no spot in cell or only a minute one, the band pale in most individuals and very narrow: first spot of underside, R^1 — R^2 , much smaller than the last.

♀. Forewing: patch R^2 — R^3 on the whole larger than in *arriphus*, sometimes nearly as long as patch R^3 — M^1 ; most specimens with a white streak in front of apex of cell; cell-patch often completely filling in apex of cell.—Hindwing: band very pale, narrow, standing outside cell or just entering apex; spot SC^2 — R^1 (the first of the Bogota form) absent from most specimens.

Hab. Cauca valley.

This is one more instance of the reduction of the markings observed among the Cauca Papilios. As in the case of *P. erithalion cauca* and *P. euryleon pithonius*, we find also here all intergradations between the Cauca and Magdalena or "Bogota" forms. It appears to us that intergradations are especially often observed in the lower as well as the upper districts of the Cauca valley, while the typical Cauca forms come from the middle portion of the valley.

In the Tring Museum 40 ♂♂ and 34 ♀♀ from Pereira and Popayan.

e. P. arcas arcas Cram. (1781).

(?) Seba, *Thesaur.* iv. p. 38. t. 30. fig. 25. 26 (1764) (fig. *mahe*).

(?). ♂. *Papilio Eques Trojannus viridimaculatus* Goeze, *Ent. Beytr.* iii. 1. p. 44. n. 24 (1779) (this species?).

♀. *Papilio Eques Trojannus arcas* Cramer, *l.c.* iv. p. 174. t. 378. fig. C. (1781) ("Brazil"); Jabl. & Herbst, *Naturs. Schmett.* ii. p. 83. n. 24. t. 10. fig. 3 (1785); Jung, *Alphab. Verz. Schmett.* p. 46 (1791); Esper, *l.c.* p. 146. n. 68. t. 38. fig. 2 (1793).

♀. *Papilio Eques Trojannus curimedes* Stoll, *l.c.*; Esper, *Ausl. Schmett.* p. 60. n. 26. t. 15. fig. 2 (1788). *Parides aeneas*, Hübner (non Linné, 1758, err. det.), *Verz. bek. Schmett.* p. 87. n. 908 (1818?).

Papilio curimedes, Godart, *Enc. Méth.* ix. p. 31. n. 26 (1819) (♂, Guyane); Boisd., *Spec. Gén. Lép.* i. p. 285. n. 111 (1836); Doubl., Westw. & Hew., *Gen. Diurn. Lép.* i. p. 18. n. 204 (1846) (Guiana; Venezuela); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 50. n. 244 (1852) (Venezuela; synon. *partim*); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 64. n. 257 (1856) (*partim*; Venezuela); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 111 (1864) (*partim*); Hahnel, *Iris* iii. p. 138 (1890) (San Esteban, in forest); Poujade, *Bull. Soc. Ent. France* p. 140. n. 1 (1895) (Venezuela).

♀. *Papilio arcas*, Godart, *l.c.* p. 37. n. 35 (1819) ("Brazil"); Boisdu, *l.c.* p. 293. n. 122 (1836) ("Brazil"); Doubl., Westw. & Hew., *l.c.* i. p. 18. n. 195 (1846) ("Brazil"); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 46. n. 228 (1852) ("Brazil"); id., *List Lep. Ins. Brit. Mus. i. Pap.* p. 61. n. 241 (1856); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 295. n. 60 (1864) (Brazil?); Kirby, *Cat. Diurn. Lep.* p. 527. n. 61a (1871) (Brazil?).

Papilio eurymedes (!), Erichson, in Schomb., *F. F. Brit. Guiana* p. 593 (1848).

♂. Forewing with white spot R^3-M^1 above and below, seldom vestigial.—Hindwing: red patch large, entering cell on underside as well as upper, but the cell-spot usually much shaded with black on underside.

♀. Red band of hindwing large, brighter red than in the Colombian forms.

Hab. The Guianas; Venezuela.

The insect figured by Cramer as *arcas* is without doubt the female of the present subspecies. The fringe-spots of the hindwing are white in the figure; but that is surely a mere error in coloration, since similar mistakes occur in other figures—for instance, in fig. F of Pl. 386, which represents the male of *arcas* (= *eurymedes*).

In the Tring Museum 16 ♂♂, 14 ♀♀, from: Cayenne; San Esteban, October, 1896 (Dr. Bürger); Mérida and Tachira (Briceño); Valencia.

45. *Papilio timias* Gray (1852).

♂. *Papilio timias* Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 203 (1846) (*nom. nud.*; Guayaquil); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 50. n. 242. t. 9. fig. 3 (1852); id., *List Lep. Ins. Brit. Mus. i. Pap.* p. 64. n. 255 (1856); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 296. n. 110 (1864).

♀. *Papilio bimaculatus* Hewitson, *Exot. Butt. v. Pap.* t. 14. fig. 47 (1875) (Ecuador).

♂♀. *Papilio eurymedes* var. b. *P. timias*, Kirby, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 530. sub n. 76 (1871); id., *l.c.* p. 809. n. 76 (1877) (*bimaculatus* ♀ of *timias*).

This insect takes a similar position towards *P. arcas* as does *P. zacyanthus* towards *P. neophilus* (= *aeneides* auct.); but, while in *zacyanthus* it is the male which differs more essentially from *P. neophilus*, it is the female of *timias* which differs conspicuously from *P. arcas*.

There is apparently no structural difference between *timias* and *arcas*. Male with a large green patch on forewing from inner margin beyond R^3 and two conspicuous white spots R^2-M^1 ; apical half or third of cell of hindwing red. In female the forewing bears two rounded spots, R^2-M^1 , white, more or less shaded with brown, the upper one being the larger; red band of hindwing across apex of cell, its proximal edge nearly straight. Cell of forewing with or without small subapical spot, never with broad patch as in ♀ *P. arcas*.

Hab. West Ecuador.

Two subspecies.

a. *P. timias timias* Doubl. (1846).

♂. *Papilio timias* Gray, *l.c.* (Guayaquil).

♀. *Papilio bimaculatus* Hewitson, *l.c.* (Ecuador).

Papilio eurymedes var. *timias*, Maas. & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 66. u. 23 (1890) (Guayaquil).

♂♀. *Papilio bimaculatus*, Haensch, *Berl. Ent. Zeitschr.* xlviii. p. 150 (1903) (Palmar, W. Ecuador, Jul.).

♂. Forewing: no green spot in cell, or only a few green scales; green patch M^2-SM^2 usually not extended to base of M^2 .—Hindwing: red spot R^1-R^2 of underside (first spot) longer than, or at least as long as, the last spot.

♀. Forewing: no spot in cell or only a vestige; white discal spots more or less washed with brown, often small.—Hindwing: cell-spot usually shaded with brown proximally, spot R^1-R^2 at least as long as spot M^1-M^2 , the band somewhat narrowing behind and deeply incised distally at the veins; on underside the band more strongly narrowing than above, spot R^1-R^2 being much longer than spot M^2-SM^2 ; no spot at abdominal edge or only a vestige of a spot.

Hab. Guayaquil and neighbouring districts at a low elevation: Chimbo, La Chima, Los Ríos, Bahahoyo, Arenillas, Palmar, etc.

In the Tring Museum 22 ♂♂, 13 ♀♀, from: Cachabi, January 1897 and Chimbo, 1000 ft., August 1897 (Rosenberg); Palmar (R. Haensch); Naranjas, Guayaquil (O. T. Baron); Quevedo (v. Buehwald).

b. P. timias potone subsp. nov.

♂. Forewing: a more or less distinct cell-spot; green patch wider than in *P. t. timias*, white spots generally larger.—Hindwing: spot R^1-R^2 not longer than M^1-M^2 , streak $M^2-(SM^1)$ usually long; on underside spot R^1-R^2 smaller than spot M^2-SM^2 .

♀. Forewing: mostly with conspicuous cell-spot, patch R^3-M^1 usually larger than in *P. t. timias*.—Hindwing: band widening behind; on underside spot R^1-R^2 shorter than M^2-SM^2 ; a distinct spot at abdominal edge, the cell-spot and the middle ones larger than in the preceding, the veins separating them less extended black.

Hab. West Ecuador: Paramba; also Ambato. At higher elevations than the preceding subspecies.

In the Tring Museum 6 ♂♂, 10 ♀♀, from: Paramba, 3500 ft., February and March 1897 (Rosenberg); Paramba (Flemming & Miketta).

SUBSECTION B.

Antenna without distinct grooves; end-segment very short, more or less completely fused with the preceding segment. Claws more or less symmetrical, at least of hindleg. Markings of body not bright red, being white or yellow, rarely rufous, in this case the hindwing with a red dot at base; dots on abdominal sternites (if present) always white; no red spots or band in centre of hindwing; submarginal spots always present, often also admarginal ones. Subbasal cell of hindwing not widening apicad; cell rounded at apex, cross-vein D^3 leaning distad anteriorly, the cell-angle D^3-D^1 being larger than the cell-angle D^2-D^3 , or at least as large.

♂. Scent-organ never woolly, consisting of a stripe of short scales, there being a naked streak along the fold on the discal side. Tenth abdominal tergite shorter than the sternite. Clasper short; harpe very short, not reaching to centre of clasper, usually ending in two teeth, of which one is lost or modified in many forms, there being often some small additional teeth. Tibiae not incrassate, similar in the sexes.

♀. Vaginal cavity large, covered on hinder side by a smooth convex sclerite, which bears distally a small groove of which the proximal edge is raised, somewhat resembling the lip of a jug. Proximally within this cavity two large membranaceous hairy flaps, which are either separated or are almost merged together. Ana

segment proximally with some short stout spinelike bristles. The lateral tubercle of the prothorax of the larva is much prolonged.

The species are much less numerous than in Subsection A. Though some of the species are more nearly related with one another than with the other members of the Subsection, the differences in structure are very slight. It appears to us, therefore, advisable to keep all the species united in one group, by which means the close relationship between them will be best emphasised. In the key the species are grouped according to relationship.

IV. Polydamas Group.

Key to the species :—

- | | |
|---|-----------------|
| <i>a.</i> Tailed ; tail sometimes absent, such specimens recognisable as belonging here by the strong blue-green gloss in the distal half of the underside of the hindwing ; white discal spots on underside of hindwing, besides the submarginal row of orange or red spots | <i>b.</i> |
| No tail ; spots of body rufous red, or underside of hindwing with white central band | <i>c.</i> |
| No tail ; spots of body yellow | <i>d.</i> |
| No tail ; breast and sides and undersurface of abdomen greenish yellow, long-hairy | <i>e.</i> |
| <i>b.</i> Hindwing below strongly glossy bluish green in outer half. | Species No. 46. |
| Hindwing below not glossy green, distally with several small white spots in middle of wing behind cell and in apex of same | Species No. 47. |
| Hindwing below not glossy green distally, with a band of large white patches in middle | Species No. 48. |
| <i>c.</i> Forewing without band of spots on upperside | Species No. 49. |
| Forewing with band of spots on upperside ; hindwing below for the greater part creamy buff | Species No. 50. |
| Forewing with band of spots on upperside ; hindwing below brown | Species No. 51. |
| <i>d.</i> Hindwing below with red spots | Species No. 52. |
| Hindwing below without red spots | Species No. 53. |
| <i>e.</i> Hindwing above with a regularly curved discal row of seven greenish white spots parallel to distal margin, separate from cell, the last spot, which is double, being at least as large as the second ; submarginal spots also marked ; forewing with a row of spots | <i>f.</i> |
| Discal band of hindwing absent, or touching cell, or entering it, or the spots decreasing in size, the last ones being minute, while the first is very large | <i>g.</i> |
| Hindwing above with white streak along abdominal fold | Species No. 58. |
| <i>f.</i> Red submarginal spots on underside of hindwing transverse, contiguous with creamy white spots | Species No. 54. |
| Red submarginal spots of hindwing arched ; no white admarginal spots. | Species No. 55. |

- g. White costal patch on upperside of hindwing of male very large, extending to base; forewing with white streak in cell and some large patches on disc (females and most males) Species No. 59.
 White costal patch of hindwing not reaching base, creamy white; no streak in cell of forewing and no large patches on disc close to cell; or there is a large patch in apex of cell h.
 h. Hindwing below with small white admarginal dots . . . Species No. 56.
 Hindwing below without white admarginal dots; red submarginal spots thin Species No. 57.

46. *Papilio philenor* L. (1771).

Papilio Eques Trojanus philenor Linné, *Mant. Plant.* p. 535 (1771) (America).

Papilio Eques Trojanus astinoux Drury, *Illustr. Exot. Ins.* i. p. 21. t. 11. fig. 1. 4. ♂ and Index (1773) (New York; Maryland; Virginia).

Larrias philenor, Hübner, *Verz. bek. Schmett.* p. 84. n. 858 (1818?); Sendd., *Butt. E. U.S. & Canada* ii. p. 1241 (1889).

♂ ♀. A close ally of *P. polydamas*, being more generalised than that species in the preservation of a tail (in most specimens), and of dots on the abdominal sternites, and more specialised in the development of metallic colours and in the reduction of the markings of the upperside.

The presence of white discal dots on the underside of the hindwing is also a generalised character, which is still more in evidence in *P. devilliers* and *zetes*. Comparing the forewings of *polydamas* and *philenor* a close agreement in the phyletic development of the spots will be observed. In both species the spots in the apical region are the first to disappear, being longer preserved on the upper than on the underside, the apical area of the underside assuming a faded tint. The posterior spots of the upperside, however, which in *polydamas* are always present, while they are often absent like the anterior ones in *philenor*, are always smaller than the respective spots of the underside, the latter spots being preserved when those of the upperside have disappeared.

The development in the markings of the hindwing is opposite in the two species. In *polydamas* the band of spots of the upperside remains comparatively broad, in connection with the development of the spots of the forewing, the spots being rarely reduced to narrow lunules. The corresponding spots of the underside have been shifted towards the distal margin, and are reduced to more or less narrow bars. In *philenor*, on the contrary, the spots of the upperside are much reduced, being sometimes absent, those of the underside being much larger.

The preservation of a tail in *P. philenor* and the West Indian *zetes* (Haiti) and *devilliers* (Cuba), and the occasional absence of the tail from Mexican specimens of *philenor*, are significant facts worthy of special mention. If the tail is a useful appendage developed to give protection to the individual, the projecting tail being taken hold of by an insect-feeder and breaking off, affording the insect a chance of escape, as is the opinion of adherents of this variety of Natural Selection, we must naturally conclude that in countries where there is a greater number of tailed species the persecution of the insects must be more vigorous than in districts which are inhabited by comparatively few tailed species.

Now, with the exception of two species (*hahneli* from the Amazons, and *phalaecus* from Ecuador) all the tailed species of the vast group of American Aristolochia-Swallowtails occur in the countries from Costa Rica northwards, and in the Brazilian faunistic subregion (inclusive of Paraguay and Argentina). Is it at all likely that in the Andesian and Amazonian provinces, from Bolivia to Costa Rica and eastwards to the Guianas and Pará, the tail is an unnecessary appendage in these insects and has therefore been dropped, while it is a useful passive means of defence in the other districts? Considering further that these Aristolochia-feeders are supposed to be practically immune, their nasty smell protecting them from insect-feeders (perhaps not against inexperienced young individuals), it appears to us certain that the presence of a tail in nearly all the Aristolochia-Papilios occurring from Nicaragua northwards, as well as in almost every species found in the Brazilian province, has nothing to do with a supposed usefulness of the tail as a passive means of protection, and that accordingly the occasional absence of the tail from Mexican specimens of *philenor* is due to a physiological change of the species in the southern districts of its range. *P. philenor* was originally doubtless an inhabitant of the Atlantic district of the Nearctic Region; the close morphological connection between the Continental *philenor*, the Cuban *devilliers* and the Haitian *zetes* pointing decidedly in this direction. From this original home the species spread southward and westward into Mexico, and at the Pacific coast again northward as far as Northern California, Californian, Arizonan and Mexican specimens differing on the whole slightly from eastern ones.

The scales of the upperside of the forewing are denticulate in *P. philenor*, except towards the hinder angle; on the hindwing, on the contrary, the scales are entire, except in the region of the tail and anal angle. On the underside the scales are dentate on both wings, the inner area of the forewing excepted. The white spots attached to the orange spots of the hindwing are homologous to the white spots of *P. polydamas*, which stand in the same connection with the red spots in this species. The basal dot of the hindwing of *P. philenor*, on the underside, is found in all the near allies of *P. polydamas*, the corresponding dot of the forewing being also present in *P. polydamas*. The scent-organ of the male and the genitalia of both sexes are essentially as in *P. polydamas*, being only slightly different.

The spring specimens of *P. philenor* appear to be on the whole smaller than the later individuals, and bear always a row of spots on the upperside of the forewing, this row being often absent from the males of the summer brood (or broods). The hairiness of the body varies considerably, early Californian specimens having quite a shaggy appearance.

Scent-organ: the scales are smaller than in *P. polydamas*, those of the streak of small scales situated along the naked streak being moreover less triangular.

Genitalia: ♂. The lateral edges of the tenth tergite are elevate in proximal half, the distal half of the process appearing depressed in a lateral view. Harpe with two processes as in *P. polydamas*, both short, pointed, the ventral one compressed and broader than the dorsal process.—♀. Hairy flaps in front of cavity large, connected with one another at base, acuminate, each bearing on the distal side a carina which extends on to the membranous proximal wall of the cavity.

For early stages, see literature under *P. ph. philenor*.

Hab. United States, except the central district from Colorado northwards; Mexico,

a. P. philenor philenor L. (1771).

- Papilio Eques Trojanus philenor* Linné, *Mant. Plant.* p. 535 (1771) (America); Fabr., *Syst. Ent.* p. 445. n. 12 (1775) (America; = *asteneus*); Goeze, *Ent. Boytr.* iii. 1. p. 39. n. 2 (1779); Fabr., *Spec. Ins.* ii. p. 4. n. 15 (1781); id., *Mant. Ins.* ii. p. 2. n. 15 (1787); Jahl. & Herbst, *Naturs. Schmett.* ii. p. 271. n. 52. t. 19. fig. 2. 3 (1784); Esper, *Aust. Schmett.* p. 49. n. 19. t. 11. fig. 3 (1785); Panz., *Drury's Abbild.* p. 54. t. 11. fig. 1. 4 (1785); Gmelin, *Syst. Nat.* i. 5. p. 2228. n. 282 (1790); Fabr., *Ent. Syst.* iii. 1. p. 6. n. 18 (1793).
- Papilio Eques Trojanus astineus* Drury, *Illustr. Exot. Ins.* i. p. 21. t. 11. fig. 1. 4. ♂ (1773) (New York; Maryland; Virginia); Cram., *Pap. Exot.* iii. p. 26. t. 208. fig. A. B. ♂ (1779) (New York); Jung, *Alphab. Verz. Schmett.* i. p. 59 (1791) (= *philenor*).
- Papilio Eques Achirus astineus* (!), Stoll, in Cram., *Pap. Exot.* iv., *Ordre Syst.* p. 3. note 2 (1782) (= *philenor*).
- Princeps dominans philenor*, Hübner, *Samml. Exot. Schmett.* i. t. 128 (1806—?).
- Laertius philenor*, id., *Verz. bek. Schmett.* p. 84. n. 858 (18181); Scudd., *Syst. Rev. Amer. Butt.* p. 43 (1872); id., *Geol. New Hampsh.* i. p. 359. t. A. fig. 15. 17 (1874); id., *Butt. E. U.S. & Canada* ii. p. 1241. t. 16. fig. 3, t. 26. fig. 6, t. 35. fig. 24, 25, t. 40. fig. 8, t. 43. fig. 19, t. 45. fig. 4, 5, t. 46 fig. 42, t. 56. fig. 8, t. 66., *Pap. Exot.* iii. p. 26. t. 208. fig. 13. 20. 21, t. 80. fig. 1—5, t. 85, fig. 14 (1889); id., *Psyche* viii. p. 207. t. 5. fig. 1 c. larva juv. (1898); Dyar, *Bull. U.S. Nat. Mus.* lii. p. 4. n. 23 (1902).
- Papilio philenor*, Jung, *Alphab. Verz. Schmett.* ii. p. 102 (1792) (India!); Abbot & Smith, *Lep. Ins. Georgia* i. p. 5. t. 3 (1797) (l, p., ♂, ♀); Say, *Amer. Entom.* No. 1. plate (1817); Godt., *Enc. Méth.* ix. p. 40. n. 47 (1819); Boisd. & Lec., *Hist. Gén. Lép. Amér. Sept.* p. 29. t. 11 (1833) (l, p., ♂); Lucas, *Lép. Exot.* p. 15. t. 8. fig. 2 (1835); Boisd., *Spec. Gén. Lép.* i. p. 324. n. 167 (1836); Lucas, *Vade-mecum* p. 50 (1838); id., in Guér., *Diét. Pitt. Nat.* vii. p. 48 (1838); Drury, ed. Westw., *Illustr. Exot. Ins.* i. p. 20. t. 11. fig. 1. 4 (1837); Harris, *Entom.* i. p. 60 (1841) (Massachusetts, l. on *Aristolochia siphoc.*, August); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 15 (1845); id., in Westw., *Arc. Ent.* i. p. 68 (1845) (habits); Lucas, *Lép. Exot.* p. 15. t. 8. fig. 2 (1845); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 19. n. 230 (1846) (U.S.A.; Mexico); Kirtl., *Proc. Ent. Soc. Lond.* (2). i. p. 101 (1851) (l. on *Aristolochia*); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 66. n. 291 (1852) (California); Boisd., *Ann. Soc. Ent. France* p. 282. n. 4 (1852) (California); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 75. n. 308 (1856) (Ohio; Florida; California; "Nicaragua"); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 6. n. 90 (1857) (Mexico); Urban, *Cun. Nat. Geol.* iii. p. 400. fig. a. b. (1858); Gosse, *Letters from Alabama* pp. 77, 148, 272 (1859); Newm., *Proc. Ent. Soc. Philad.* 26 (1861) (N. Jersey; on *Serpentaria*); Morris, *Syn. Lep. N. Amer.* p. 6. n. 8 (1862); Reak., *Proc. Ent. Soc. Philad.* ii. p. 141. n. 13 (1863) ("Chiapas," error loci); Weidem., *ibid.* p. 147 (1863) ("Mexico, West Indies, Cent. America"); Kirkp., *ibid.* iii. p. 328 (1864) (Cleveland, Ohio, common); Jaeger, *Life N. Amer. Ins.* p. 209 (1864); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 297. n. 113 (1864) (U.S.A., Calif., Mexico); Behr, *Stett. Ent. Zeit.* xxvii. p. 216 (1866) (Calif.); Pack., *Guide Study Ins.* p. 248. fig. 181 (1868); Butl., *Cat. Diurn. Lep. descr. Fabric.* p. 237. n. 13 (1869) (Ohio); Harris, ed. Flint, *Ent. Corresp.* p. 147, 273. fig. 37. 38 (1869); Beth., *Canad. Nat.* iii. p. 320 (1871) (habits); Riley, *2nd Missouri Rept.* p. 116. fig. 84. 85. 86 (1870) (life history); Kirby, *Cat. Diurn. Lep.* p. 521. n. 20 (1871); Scudd., *Canad. Ent.* iv. p. 74. (1872) (Abbot's MS. in Brit. Mus.); Edw., *Proc. Cal. Ac. Sc.* v. p. 162 (1873) (larva, pupa; occurrence in Calif.); Butl. & Druce, *Proc. Zool. Soc. Lond.* p. 364. n. 367 (1874) ("Costa Rica," error); Edw., *Proc. Calif. Ac. N. Sc.* v. p. 162 (1875) (pupa); Ison, *Rept. Ent. Soc. Ontario* p. 15 (1876) (rare, Cleveland); H. W. Edw., *Trans. Amer. Ent. Soc.* vi. p. 9. n. 3 (1877) (Atlantic to Pacific, Canada to Gulf of Mexico); H. Edw., *Proc. Cal. Ac. Sc.* v. vii. p. 19 (1877) (pupa); French, *Trans. Dept. Agric. Illin.* xv. p. 136 (1877) (larva); Aaron, *Canad. Ent.* ix. p. 200 (1877); Grote, *l.c.* p. 220 (1877) (pollen on eye); White, *l.c.* x. p. 20 (1878) (pollen on eye); Streck, *Cat. Butt. Moths N. Amer.* p. 67. n. 1 (1878); Gerh., *Macro-Lep. N. Amer.* p. 25. n. 436 (1878); Dury, *Cincinnati Soc. Nat. Hist.* i. p. 12 (1878) (Cinc., common); Beth., *Canad. Ent.* xi. p. 203 (1879) (Hamilton, Ont.; one year in abundance); Oberth., *Et. d'Ent.* iv. p. 98. n. 304 (1880) (Mexico; Texas; Florida); Saund., *Rept. Ent. Soc. Ontario* p. 37. fig. 16. 17. 18 (1880); Moffat, *ibid.* p. 10 (1881) (Long Point and Ridgeway); Saund., *ibid.* p. 39. fig. 16. 17. 18 (1881) (i. l. p.); Edw., *Canad. Ent.* xiii. p. 9. (1881) (life history); Hagen, *ibid.* p. 37 (1881) (l. on *A. siphoc*); Middl., *Trans. Dept. Agric. Illin.* xviii. *Append.* p. 73. fig. 6 (1881); Coquill., *ibid.* xviii. *Append.* p. 164 (1881) (larva); Riley, *Amer. Natural.* p. 327. fig. 1. 2. 3 (1881) (life hist.); Edw., *Canad. Ent.* xiv. p. 21 (1882) (oviposition); Butl., *Journ. Linn. Soc. Lond.* xvi. p. 472. n. 58 (1883) (Mendocino

- and Lake Co., June); Bebr, *Bull. Cal. Ac. Sc.* i. p. 64 (1884) (Calif., common, l. on *Aristo-
lochia*); Edw., *Canad. Ent.* xvi. p. 109, 112 (1884) (egg, larva); Gruber, *Jenische Zeitschr.
Naturw.* xvii. p. 474. t. 7. fig. 20—24 (1884); id., *Papilio* iv. p. 88. t. 2. f. 20—24 (1884) (transf.);
Lintn., *ibid.* iv. p. 136. n. 1 (1884) (Rio Grande); Aaron, *ibid.* iv. p. 172 (1884) (S. Texas);
Mayn., *Butt. N. Engl.* p. 49. n. 67. t. 5. fig. 67. 67A. ♂ (1886); French, *Butt. E. U. States* p. 88
(1886); Mayn., *Butt. New Engl.* p. 49. t. 5. fig. 67. 67A (1886); Royst. & Pigott, *Journ. Queb.
Club* (2). iii. p. 205 (1888) (scaling); Edw., *Syn. N. Amer. Butt.*, in *Butt. N. Amer.* i. p. 1. n. 1
(1888); *ibid.*, *Bull. U.S. Nat. Mus.* xxxv. p. 9 (1889) (liter. on metamorph.); Skinn. & Aaron,
Canad. Ent. xxi. p. 126 (1889) (larva on *Ipomoea* !); Godm. & Salv., *Biol. Centr. Amer.*, *Rhop.*
ii. p. 204. n. 21. t. 65. fig. 18. 18a. fold and genit. (1890) (North Amer.; Mexico); Mayn., *Man.
N. Amer. Butt.* p. 4. n. 2 (1891); Staley, *Canad. Ent.* xxiv. p. 204 (1892) (Marshall, Missouri,
common, iv.—x.); Kunze, *ibid.* xxv. p. 17 (1893) (Long I. l. eating l. for want of food);
Haase, *Untersuch. Mimiery* i. p. 74 (1893); Davis, *Journ. N. York Ent. Soc.* I. p. 47 (1893)
(Staten I., N.Y., May to Sept.); Skinn., *Ent. News* iv. p. 82 (1893) (N. Carolina); Jones, *ibid.*
iv. p. 190 (1893) (Richmond Co., N.C.); Holl., *Canad. Ent.* xxv. p. 311 (1893) (Florida);
Beutenm., *Bull. Amer. Mus. N. H.* v. p. 242 (1893) (N. York; descr. of l., p., i.); Cockrell,
Trans. Amer. Ent. Soc. xx. p. 353. n. 648 (1893) (Rosita, Colorado); Denton, *Ent. News* v.
p. 41 (1894) (Cambridge, Mass.); Moore, *ibid.* p. 77 (1894) (Bridgeport, Conn. larvae on
Aristol. serpentaria); White, *ibid.* v. p. 175 (1894) (Brooklyn); Soule, *Psyche* vii. p. 155 (1894)
Nonquitt, Mass., August); Weed, *ibid.* vii. p. 130. n. 39 (1894) (N.E. Miss.); Beth., *Rept.
Ent. Soc. Ontario* xxiv. p. 6 (1894) (Toronto & Hamilton); Holl., *ibid.* p. 53. fig. 27 (1894);
Osburn, *Ent. News* vi. p. 282. n. 48 (1895) (Tennessee, abundant, iv. to x., probably three
broods); Longl., *ibid.* vi. p. 314 (1895) (Chicago); Blatchl., *Canad. Ent.* xxviii. p. 266 (1896)
(Indiana; l. on *Asarum* !); Truman, *Ent. News* viii. p. 29 (1897) (Volga, S. Dakota, travel-
worn); Bubna, *ibid.* viii. p. 98 (1897) (Cleveland, Ohio; plentiful on May 2nd and 3rd, a few
in July); Britton, *ibid.* ix. p. 173 (1898) (Newhaven, Ct., common); Duzee, *Bull. Buffalo Soc.
N.Sc.* v. p. 107. n. 2. (1897) (Buffalo, very scarce); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 273
(1897); Moffat, *Rept. Ent. Soc. Ontario* xxvii. p. 79 (1897) (London, Ontario); Gibson, *ibid.*
p. 106. fig. ♂ (1897) (Toronto, said to be seen !); Moffat, *l.c.* p. 109. n. 85. (1897) (Pt. Hope,
August); Dent., *Moths Butt. U.S.* p. 354. t. 19 (1898—1900); id., *Ent. News* xi. p. 580 (1900)
(Wellesley); id., *l.c.* p. 643 (1900) (ex. with five red submarg. spots on hindwing); Beutenm.,
Butt. N. York City p. 8. n. 6. fig. (1902); Wasman, *Ent. News* xiii. p. 28 (1902) (aberr.,
corresp. to *calverleyi*); Comst., *ibid.* xiii. p. 76 (1902) (L. Josephine, Fla.); Foster, *ibid.* xiii.
p. 326 (1902) (Claremont, N.H.); Hoag, *ibid.* xiv. p. 321 (1903) (S. Louis Potosi, Mex.); Baker,
Proc. U.S. Nat. Mus. xxix. p. 128 (1905).
- Papilio astenous* (!), Doubleday, *List Lep. Ins. Brit. Mus.* i. p. 15 (1845) (sub synon.).
- Pachlopta* (?) *philenor*, Reakirt, *Proc. Ent. Soc. Philad.* iii. p. 504 (1865).
- Papilio philenor* var. *acauda* Oberthür, *Et. d'Ent.* iv. p. 98. sub n. 304 (1880) (bab ?).
- Papilio philiuor* (!), Edwards, *List Diurn. Lep.*, in *Butt. N. Amer.* ii. No. 2 (1881).
- Papilio nezahualcoyotl* Strecker, *Proc. Ac. Nat. Sci. Philad.* xxxvii. p. 174 (1885) (Mexico); id.,
Lep. Rhop. Hel., *Suppl.* iii. p. 17 (1900) (= *acauda* = *corbis* = *orsut*).
- Papilio corbis* Godman & Salv., *Ann. Mag. N. H.* (6). iii. p. 357. n. 16 (1889); *ibid.*, *Biol. Centr.
Amer.*, *Rhop.* ii. p. 205. n. 22. t. 66. fig. 7. 8. ♂ (1890) (Valladolid, Yucatan).
- Papilio philenor*, Linn., var. *obsoleta*, ♂, Ehrman, *Canad. Ent.* xxxii. p. 348 (1900) (S.W. Penn.).
- Papilio philenor* Linn., aberr. *wasmuthi* Weeks, *Journ. N. York Ent. Soc.* ix. p. 82. t. 6 (1901)
(Brooklyn).
- Ithobalus acauda*, Dyar, *Bull. U.S. Nat. Mus.* lii. p. 4. n. 24 (1902) (New Mexico; Mexico: *philenor*
standing in another genus!).
- Pterurus* (?) *philenor*, Kirby, in Hübner, *Samml. Exot. Schmett.* ed. ii. p. 100. t. 129. fig. 1. 2 (190—?).
- Papilio philenor* var. *wasmuthi*, Franck, *Ent. News* xv. p. 47 (1904) (Flatbush).
- Papilio philenor* *wasmuthi*, Skinner, *ibid.*, *Index* p. 6 (1904).
- Papilio* (*Laertias*) *philenor*, Floersheim, *Ent. Rec.* xviii. p. 104 (1906) (protective taste of pupa).

♂♀. The individuals from the Atlantic States have generally a more elongate hindwing than the majority of the southern and western specimens; the marginal spots of both wings are often smaller, the spots on the upperside of the forewing are more often absent or vestigial in the males, and the distal margin of this wing is rather more concave; the metallic distal area of the underside of the hindwing is less often green, and the body is rarely so shaggy as in some western specimens.

However, these distinctions are by no means reliable, the species being apparently in a process of separating in an Atlantic and in a southern and Pacific form.

Two kinds of striking aberrations from the ordinary type are known :

a'. ab. *wasmuthi* Weeks, *l.c.*—♀. Marginal spots of both wings very much enlarged, forming large patches ; on the underside of the hindwing these patches are merged together with the orange spots into a complete band, the veins remaining very thinly black. One specimen in the Tring Museum.

b'. ab. mex. *acauda* Oberth., *l.c.* ; *P. nezahualcoyotl* Strecker, *l.c.* ; *P. corbis* Godm. & Salv., *l.c.*—♂. Tail of hindwing reduced to a tooth ; the metallic distal area of the underside of the hindwing reduced in width (always ?), its inner edge (and the white discal dots) being far separate from cell. This form is known only from Mexico (Yncatan ; Guadalajara).

Hab. of *P. ph. philenor* : Atlantic States and Southern Canada, but in the latter country and New England only a straggler, appearing sometimes to breed where *Aristolochia siphon* is found (as a cultivated plant) ; its range being originally less extended on account of the true food-plant (*A. serpentaria*) not occurring in N. England and Canada ; Mexico, from Vera Cruz to the Pacific Coast ; Colorado ; Arizona ; California.

In the Tring Museum some larvae and pupae, and 195 ♂♂, 95 ♀♀, from : Brooklyn ; Raleigh, N. Carolina (Brimley) ; Nelson Co., W. Virginia (Wirt Robinson) ; Sanford, Florida ; Makanda and Evanston, Illinois (Snyder) ; Nashville, Tennessee (W. Osburn) ; Jefferson Co., Kentucky (Troxler) ; Monterey and San Luis Potosi, Mexico ; Jalapa, Vera Cruz, February 1894 (W. Schaus) ; Iguala, Guerrero, 2500 ft., June 1904 (A. Hall) ; Guadalajara, July and October 1896 (W. Schaus) ; Verde R. and Nogales, Arizona (Oslar) ; Huachuca Mts. and Phoenix, Arizona (Dr. Kunze) ; Benson, Arizona (O. T. Baron) ; Clarion I., December 1900 (Beck) ; San Luis Obispo, California ; McCloud R., Shasta, and Siskiyou Co., California (O. T. Baron) ; Butte Co., California, April 1898 (Mrs. Austin).

b. P. philenor orsua.

Papilio orsua Godman & Salv., *Ann. Mag. N. H.* (6). iii. p. 358. n. 17 (1889) ; *id.*, *Biol. Centr. Amer.*, *Rhop.* ii. p. 205. n. 23. t. 66. fig. 9. 10. ♂ (1890) (Tres Marias Is.).

♂♀. A small form, with short rounded hindwing bearing a tooth instead of a tail. Upperside of hindwing more strongly glossy than in *P. ph. philenor*, especially in female. Glossy area of underside of hindwing touching cell, the apex of which is also somewhat metallic.

Hab. Tres Marias Islands.

47. *Papilio devilliers* Godt. (1824).

Papillon devilliers Godart, *Mém. Soc. Linn. Paris* ii. *Lép.* t. 1. fig. 3. 4, ♂ (1822) (Cuba).

Papilio devilliers *id.*, *Enc. Méth.* ix. *Suppl.* p. 810. n. 47-8 (1824) (Cuba) ; Poey, *Mém. R. Soc. Econ. Habana* p. 235 (1846).

Papilio villiersi (?), Boisduval & Lec., *Hist. Gén. Lép. Amér. Sept.* p. 36. t. 14 (1833) (Florida ; Cuba) ; Boisduval, *Spec. Gén. Lép.* i. p. 325. n. 168 (1836) ; Doubl., Westw. & Hew., *Gen. Diurn. Lép.* i. p. 19. n. 231 (1846) (Cuba ; Florida) ; Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 66. n. 292 (1852) ("N. America") ; *id.*, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 76. n. 309 (1856) ("N. America") ; Lucas, in Sagra, *Hist. Fis. Cuba* vii. p. 207 (1857) ; Morris, *Squ. Lep. N. Amer.* p. 12. n. 17 (1862) ("Southern States") ; Weidem., *Proc. Ent. Soc. Philad.* ii. p. 148 (1863) (U. St. ? ; West Indies) ; Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 297. n. 112 (1864) (Cuba ; Florida) ; Edw., *Trans. Amer. Ent. Soc.* vi. p. 9. n. 4 (1877) (Florida ; Cuba) ; Oberth., *Et. d'Ent.* iv. p. 98. n. 305

(1880) (Cuba); Gundl., *Papilio* i. p. 113 (1881) (Cuba); Edw., *Syn. N. Amer. Butt.*, in *Butt. N. Amer.* i. p. 1. n. 2 (1888) (Florida; Cuba); Haase, *Untersuch. Mimicry* i. p. 75 (1893) (Cuba; Florida).

Papilio devilliersi, Herrich-Sch., *Corr.-Bl. Zool. Min. Ver. Regensb.* p. 173. n. 7 (1864) (Cuba; not common); Kirby, *Cat. Diurn. Lep.* p. 520. n. 19 (1871); Streck, *Cat. Butt. Moths N. Amer.* p. 67. n. 2 (1878) (? Florida; Cuba); Gerh., *Macro-Lep. N. Amer.* p. 25. n. 435 (1878) (Florida); Gundl., *Contr. Ent. Cubana* p. 123 (1881) (Cuba; Florida).

♂ ♀. Sexes similar. More specialised in pattern than in *P. zetes*, which comes in some respects near the ancestral form of *P. polydamas*, as do *P. archidamas* and *P. streckerianus*. On the forewing there are some discal dots preserved, situated beyond the apex of the cell, either on both sides (♀) or at least on the underside (♂), the spots being larger on the underside than on the upper. The pattern of the underside of the hindwing is not unlike that of *P. polydamas*; the basal dot and costal streak of *P. polydamas* are in *devilliersi* represented by a heavy basi-costal streak; behind C there is in most specimens a vestige of a creamy subbasal spot and a silvery antemedian spot, which are homologous to the two creamy spots C—SC² found in some subspecies of *P. polydamas*; sometimes there is a complete row of silvery dots on the disc, but most specimens have only three or two or one silvery spots behind the cell and usually one in the apex of the cell, these spots being found again in *P. philenor*.

Scent-organ as in *P. philenor*.

Genitalia: ♂. Harpe triangular, produced apically into a single process, which bears some conical teeth.—♀. Hairy flaps narrowed proximally as well as apically, being ovate-lanceolate, separate at base, each bearing a ridge on hinderside as in *P. philenor*.

Early stages not described.

Hab. Cuba.

In the Tring Museum 9 ♂♂ and 9 ♀♀ from Holquin and Gibara (Tollin).

48. *Papilio zetes* Westw. (1847).

Papilio zetes Westwood, *Trans. Ent. Soc. Lond.* v. p. 36. t. 3. fig. 1. 1*. ♀ (1847) (Haiti); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* ii. *Append.* p. 529 (1852); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 66. n. 293 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 76. n. 310 (1856) (Haiti); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 148 (1863) (West Indies); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 309. n. 283 (1864); Kirby, *Cat. Diurn. Lep.* p. 543. n. 165 (1871); Haase, *Untersuch. Mimicry* i. p. 77 (1893) (near *philenor*).

♂ ♀. Sexes similar. In shape resembling *P. devilliersi*. A yellowish band across upperside of both wings, somewhat as in *P. polydamas*; some dots in and beyond apex of cell of forewing, yellowish above, larger and paler on underside.—Hindwing with a broad band of white patches on underside proximally of black discal band, these patches being all contiguous with cell except the last ones; the white spots attached to the red ones large, the pattern of hindwing reminding one of that of *P. streckerianus*.

Hab. Haiti.

In coll. F. D. Godman and also in that of H. J. Adams.

The three following species of this group are very closely allied, the near phyletic connection between *P. polydamas*, *P. archidamas*, and *P. streckerianus* being evident in every detail of pattern and structure. In fact, there would be some reason for considering all three as geographical forms of one species.

♂ ♀. Abdomen greenish black above in both sexes; sternites not dotted. Forewing below with a reddish or greenish yellow dot at base proximally of

praecostal spur; SC^2 originating from cell more proximally than in *P. betus* and *P. madyes*.

Scent-organ: a streak of minute triangular scales along the naked streak; these scales not very close together, smaller than the scales situated along abdominal edge; striation of scales heavy.

Genitalia: ♂. Harpe short, sinuate at apex, each angle produced into a curved horn-like process, the upper process being absent from some forms of *P. polydamas*.—♀. The two membranous lobes situated in front of the vaginal cavity standing close together, forming one large lobe which is deeply cleft mesially.

49. *Papilio streckerianus* Honr. (1884).

Papilio streckerianus Honrath, *Berl. Ent. Zeitschr.* xxviii. p. 395. t. 8. fig. 1. 1A. ♂ (1884) (Guahangos, Peru).

Papilio mathani Oberthür, *Et. d'Ent.* xiv. p. 1. t. 2. fig. 8. ♂, 12. ♀ (1891) (Chachapoyas).

♂. A close relative of *P. archidamas*. Markings of body pale greenish yellow, not orange or reddish. Forewing without discal band above and below, but there are in nearly every specimen vestiges of greenish streaks in the basal third of the upperside, the streak along inner margin reaching sometimes as far as the greenish spot situated in many specimens at distal fourth; the greenish yellow scaling is more extended on underside, covering here usually the greater half of the cell, often extending anteriorly beyond the apex of the cell; in many specimens there are some greenish yellow spots posteriorly on disc.—The discal band of the hindwing, on upperside, is variable in width; it usually crosses the apex of the cell, but in some specimens the cell-spot is just vestigial; the marginal spots are always large, being in some specimens twice as large as in others. The black discal band of the underside is always broad; the silvery white submarginal spots SC^2-M^1 are sharply defined; there is sometimes a vestige of a red spot at the proximal side of each white spot; the red anal bar is always present, while the red subcostal bar is often replaced by white.

♀. Much paler than the male, the discal band of the upperside of the hindwing strongly opalescent, this opalescent gloss being vestigial also in the female of *P. archidamas*.

Genitalia as in *P. archidamas*.

Early stages not known.

Hab. Northern Peru, in the dry districts of the Marañon.

It is quite possible that in a more southern district of West Peru a form exists which connects *P. streckerianus* with *P. archidamas*.

In the Tring Museum 39 ♂♂ from: Upper Marañon, east of Inamachuco, North Peru, dry country (O. T. Baron).

50. *Papilio archidamas* Boisduval (1836).

(?) *Papilio psittacus* Molina, *Sagg. Stor. Nat. Chili* p. 211, 347 (1781).

Papillon bias Roger, *Bull. Soc. Linn. Bordeaux* i. p. 159 (1826) (Chili).

Papilio archidamas Boisduval, *Spec. Gén. Léop.* i. p. 321. n. 163. (1836) (Chili); Feisth., *Mag. Zool.* (2). i. *Ins. Léop.* p. 1 (1839) (Chili); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 14 (1845) (Chili); id., Westw. & Hew., *Gén. Diurn. Lep.* i. p. 20. n. 242 (1846) (Chili); Blanch., in Gay, *Hist. Fis. Chile, Zool.* vii. p. 8. *Atlas* t. 1. fig. 1a. b. (1852); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 66. n. 295 (1852) (Chili); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 76. n. 312 (1856) (Chili); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 297. n. 116 (1864) (Chili); Kirby, *Cat. Diurn. Lep.* p. 521. n. 25c (1871); Mathew, *Ent. Mo. Mag.* xiv. p. 152 (1877) (Valparaiso, Oct. to Jan.; habits, descr. of larval stages); Oherth., *Et. d'Ent.* iv. p. 98. n. 302 (1880) (Chili); Walk., *Ent. Mo.*

Mag. xviii. p. 83 (1881) (Coquimbo, larva on *Aristolochia*; "common during our stay from Jan. 21st to March 12th"); id., *l.c.* xx. p. 223 (1884) (Coquimbo, July and August, common, fresh; succession of broods all the year); id., *l.c.* xxi. p. 118 (1884) (Coquimbo, common, March); Staud., *Exot. Tagf.* i. p. 12 (1884) (Chili); Haase, *Untersuch. Miniery* i. p. 76 (1893). *Papilio bias*, Kirby, *Cat. Diurn. Lep.* p. 521. n. 25b (1871); id., *Trans. Roy. Soc. Dublin* (2). ii. p. 324 (1880) (*archidamas* = *bias*); Butl. & Edm., *Trans. Ent. Soc. Lond.* p. 474. t. 21. fig. 1 (1881) (larva); Elwes, *ibid.* p. 293. n. 53 (1903) (Santiago, "seen"). *Papilio archeneas* (?), Mathew, *Entomol.* vii. p. 62. n. 92 (1874) (Valparaiso, Nov., common, fast flight).

Molina's description appears to apply to a certain extent to this species.

The French name "Papillon bias" of Roger is nomenclatorially not valid.

♂ ♀. The species varies a good deal in the amount of brown in the marginal area of the forewing and on the disc of the hindwing, on the underside. The yellowish marginal spots of the fore- and hindwing are sometimes enlarged.

Genitalia: ♂. Harpe with two processes, the upper one smaller than the lower one.

Early stages described by Mathew and again by Walker, II.cc.

Hab. Chili.

In the Tring Museum 14 ♂♂, 6 ♀♀.

51. *Papilio polydamas* L. (1758).

Papilio Eques Trojanus polydamas Linné, *Syst. Nat.* ed. x. p. 460. n. 11 (1758) (citat. Meriauae excepta; America).

One of the most interesting features of this species is the peculiar distribution of its geographical varieties. While the American continents, from Buenos Aires to the southern Atlantic states of the United States, are inhabited by one single subspecies, the West Indian islands appear to have each a special subspecies. On the continents and the Greater Antilles the species is very common in open ground, while it is decidedly rare on the Lesser Antilles, having perhaps become rare in consequence of extensive cultivation of the soil. There are quite a number of islands from which the species has not been recorded, though it doubtless exists there, probably in special forms, for instance on Barbuda, Grenada, St. Christopher, etc. In the position of the band of the hindwing the subspecies from Martinique is the most different from the ordinary continental form; the Sta. Lucia subspecies is characterised by an exceptionally broad band on both wings; the Guadeloupe form is extreme in the reduction of the number of spots on the forewing, the Haiti and Jamaica forms deviate from all the others in the absence of the upper process of the harpe.

In all the subspecies the band of the upperside of fore- and hindwing is on the whole rather wider in the female than in the male.

For literature on the early stages see *P. polyd. polydamas*.

Hab. Southern Atlantic states southward to Buenos Aires; West Indies.

a. P. polydamas vincentius subsp. nov. (Pl. VII. fig. 36).

♂. Halfway between *P. polyd. lucianus* and *P. polyd. polydamas*.—*Upperside*.—Forewing: a band of spots as in *P. polyd. polydamas*, spots SC^3-R^2 a little farther away from margin.—Hindwing: band curved, about five mm. from cell, not essentially different from that of *polyd. polydamas*; creamy white marginal spots distinctly enlarged, resembling those of *P. archidamas*; marginal teeth broader than in *polyd. polydamas*.

Underside.—Forewing : apical area paler than basi-discal area, but not so pale brown as in *P. polyd. polydamas*; spots SC^4-R^1 small, while spots R^2-SM^2 are much larger than above.—Hindwing almost uniformly brownish black, a grey costal streak as in *lucianus*, *xenodamas*, etc., and also a vestige of grey spot proximally of the brick-red spot $C-SU^2$; submarginal spots as large as in *xenodamas*, paler red, nearly as close to margin as in *P. polyd. polydamas*; marginal spots larger than in the other subspecies; a thin grey bar M^2-SM^2 proximally of red anal spot, preceded before M^2 by a thin oblique grey bar.

Genitalia as in *polyd. polydamas*; the carina which runs from the tip of the upper hook of the harpe proximal is oblique.

Hab. St. Vincent, March 1897 (Dr. Percy Rendall).

One ♂ in the Tring Museum.

b. P. polydamas lucianus subsp. nov. (Pl. VII. fig. 37).

Papilio xenodamas, Sharpe (non Hübner, 1822?, err. det.), *Proc. Zool. Soc. Lond.* p. 223 (1901) (Sta. Lucia); Butl., *ibid.* p. 713 (1901) (Sta. Lucia).

♂ ♀. *Upperside*.—Forewing : a complete band of large spots from SC^4 to inner margin, spot SC^5-R^1 being the smallest, a streak in front of SC^4 , somewhat shadowy but always distinct, some yellowish scaling between $SC^{4,5}$ and R^1 close to cell; the band much nearer the margin than in *neodamas* and *xenodamas*.—Hindwing : a distinct spot behind C; band curved, about two mm. distant from cell, patches SC^2-M^2 about equal in size, or the second patch a little longer than the others.

Underside.—Forewing : spots SC^4-R^1 much smaller and the others rather larger than above, no streak before SC^4 or only a vestige of it.—Hindwing : a more or less distinct grey costal streak at base outside praecostal spur, and usually a distinct grey spot behind C a little beyond middle; brick-red submarginal spots as in *xenodamas*, but much nearer the margin; a distinct grey bar proximally of red anal spot, the bar usually extended to M^1 ; creamy white marginal spots rather larger than in *xenodamas*.

Genitalia as in *P. polyd. polydamas*.

Hab. Santa Lucia.

In the Tring Museum 6 ♂♂.

In the British Museum several pairs.

c. P. polydamas xenodamas Hübner. (1822?) (Pl. VII. fig. 38).

Ithobalus xenodamas Hübner, *Samml. Exot. Schmett.* ii. t. 113. fig. 1. 2. ♂ (1822?).

Papillio eurydamas, Roger, *Bull. Soc. Linn. Bordeaux* i. p. 158 (1826) (Martinique).

Papilio xenodamas, Boisduval, *Spec. Gén. Lép.* i. p. 320. n. 161 (1836) ("Brazil"); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 20. n. 240 (1846) ("Brazil"); Doubl., *List Lep. Ins. Brit. Mus.* i. *Append.* p. 3 (1848); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 67. n. 301 (1852) ("Brazil"); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 77. n. 318 (1856) ("Brazil"); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 297. n. 117 (1864) ("Bras. austr."); Kirby, *Cat. Diurn. Lep.* p. 521. n. 23 (1871) ("Brazil"); Oberth., *Et. d'Ent.* iv. p. 97. n. 300 (1880) ("Brazil"); Staud., *Exot. Tagf.* i. p. 12 (1884) ("Brazil").

Papilio cebriones Dalman, *Anal. Entom.* p. 38. n. 3 (1823) (hab.?).

Papilio eurydamas, Kirby, *l.c.* p. 521. n. 25 a (1871) (Martinico).

Ithobalus xenodamas, id., in Hübner, *Samml. Exot. Schmett.* ed. ii. p. 91. t. 326. fig. 3. 4 (190-?) ("Brazil," false).

There are apparently only old specimens in collections. The insect inhabits Martinique, not Brazil, Hübner's *xenodamas* being the same as Roger's "*Papillon eurydamas*." It is hardly possible to decide with certainty if *xenodamas* was

published after or before *cebriones*. We accept the view of all previous authors, giving *xenodamas* priority.

♂ ♀. *Upperside*.—Forewing: band broad, upper three spots elongate, the third the smallest, sometimes an additional spot before subcostal fork.—Hindwing: band broad, bluish, close to cell, spot M^2 — SM^2 large.

Underside uniformly black, forewing brownish, band creamy white, broader than above, except upper three spots.—Hindwing deeper brown than forewing, a subbasal costal streak and a large subbasal patch before cell bluish grey, recalling the pale underside of *P. streckerianus*; red submarginal spots twice as large and twice as far away from margin as in average specimens of *P. polyd. polydamas*.

Genitalia: ♂. Harpe with two processes as in *P. polyd. polydamas*, both slender and acutely pointed, the lower one bearing proximally a regular row of teeth.

Hab. Martinique.

In the Tring Museum 1 ♂.

Two pairs in coll. Charles Oberthür.

d. P. polydamas dominicus subsp. nov. (Pl. VII. fig. 41).

Papilio neodamas, Godman & Salvin (*non* Lucas, 1852, err. det.), *Proc. Zool. Soc. Lond.* p. 318, n. 17 (1884) (Dominica).

♂ ♀. Intermediate between *P. polyd. neodamas* and *P. polyd. xenodamas*.

Upperside.—Forewing: spots situated as in *xenodamas*, standing nearer the margin than in *neodamas*, the six spots from R^2 to hinder margin smaller than in *xenodamas*, but rather larger than in *neodamas*, especially the uppermost one; three small dots SC^4 — R^2 and a vestige of dot SC^3 — SC^4 .—Hindwing: band distinctly curved, standing two or three mm. from cell, very slightly narrowing backwards; a vestigial spot C — SC^2 in male, a distinct spot in female.

Underside.—Forewing: creamy white spots intermediate in size between those of *xenodamas* and *neodamas*, spot R^2 — R^3 arrowhead-shaped like the others, spots between costal margin and R^2 absent or vestigial.—Hindwing slightly paler brown from base to disc than in *xenodamas*; a vestige of a grey subbasal streak, no grey subbasal patch C — SC^2 ; red submarginal spot a little smaller than in *xenodamas* and a little nearer the margin; no grey bar proximally of red anal spot, or only a vestige of it.

Genitalia not markedly different from those of *P. polyd. polydamas*, but the carina which runs from the upper hook proximad is parallel with the carina of the lower hook, the two carinae being proximally connected with one another by a transverse ridge which stands at right angles to them.

Hab. Dominica.

In the Tring Museum 2 ♂♂, 3 ♀♀ (E. A. Agar, and Elliott).

In the British Museum 2 ♂♂, 1 ♀.

e. P. polydamas neodamas Lucas (1852) (Pl. VII. fig. 42).

Papilio polydamas, Boisduval & Lec., *Hist. Gén. Léop. Amér. Sept.* t. 15, fig. 1. 2. ♂ (1833).

Papilio neodamas Lucas, *Rev. Zool.* (2). iv. p. 193. t. 10, fig. 5. ♂ (1852) ("Antilles"); Gray, *Cat. Lep. Ins. Brit. Mus.* i. Pap. p. 67. n. 300 (1852) ("Antilles"); Lucas, in Sagra, *Hist. Pis. Cuba* vii. p. 208. t. 14. fig. 3. 4. 1. & p. (1857) (Guadeloupe; "Yucatan" error loci); Gray, *List Lep. Ins. Brit. Mus.* i. Pap. p. 77. n. 317 (1856) ("Antilles"); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 297. n. 118 (1864) (Guadeloupe; "Cuba, Yucatan" error loci); Oberth., *Et. d'Ent.* iv. p. 97. n. 301 (1880) (Guadeloupe).

Papilio xenodamas var., Guevée, *Mém. Soc. Phys. Hist. Nat. Genève* xxii. p. 370. n. 2 (1872) (hab.?).

♂ ♀. Similar to *P. polyd. xenodamas*, but the upper three spots of the forewing

absent (♂) or vestigial (♀), the remaining spots farther away from margin.—Hindwing: discal band of *upperside* almost straight, no spot behind C, middle patches smaller than anterior ones and usually also smaller than posterior ones, the band therefore appearing narrowed in centre.—On *underside* no grey subbasal patch in front of cell.

Genitalia: ♂. Harpe as in *xenodamas*; the carinae extending from the tip of each process proximad almost parallel.

Hab. Guadeloupe.

In the Tring Museum 1 ♂, 2 ♀♀.

In coll. Charles Oberthür 3 ♂♂, 1 ♀.

f. P. polydamas polydamas Linné (1758).

Seba, *Thesaur.* iv. p. 53. t. 44. fig. 14, 15 (1765).

Papilio Eques Trojanns polydamas Linné, *Syst. Nat.* ed. x. p. 460. n. 11 (1758) (citat. Merianae excepta); id., *Mus. Lud. Ulr.* p. 192. n. 11 (1764) (in India occidentali); Houtt., *Naturl. Hist.* i. 11. p. 195. n. 11 (1767); Linné, *Syst. Nat.* ed. xii. p. 747. n. 12 (1767); Fabr., *Syst. Ent.* p. 447. n. 22 (1775); Cram., *Pap. Exot.* iii. p. 33. t. 211. fig. D. E (1779) (Surinam); Goeze, *Ent. Beytr.* iii. 1. p. 34. n. 12 (1779) (cit. Sebae et Druryi excepta); Fabr., *Spec. Ins.* ii. p. 8. n. 29 (1781); Jabl. & Herbst, *Naturs. Schmett.* ii. p. 91. n. 26. t. 10. fig. 6. 7 (1784); Esper, *Aust. Schmett.* p. 33. n. 12. t. 7. fig. 1. 2 (1785) (an fig. 1. ad hanc subsp. pertin. ?); Fabr., *Mant. Ins.* ii. p. 4. n. 31 (1787); Gmel., *Syst. Nat.* i. 5. p. 2231. n. 12 (1790); Fabr., *Ent. Syst.* iii. 1. p. 14. n. 42 (1793).

Papilio Eques polydamas, Linné, ed. Lange, *Syst. Nat.* p. 460. n. 11 (1760).

Papilio (Troes) polydamas, Müller, *Naturs.* v. 1. p. 569. n. 12 (1774).

Papilio (polydamas), Meerburgh, *Afb. Zeldz. Gew.* t. 2. 3. (1775).

Princeps dominians polydamas, Hübner, *Samml. Exot. Schmett.* i. t. 130. fig. 1. 2 (1806—).

Ithobalus polydamas, Hübner, *Verz. bek. Schmett.* p. 88. n. 913 (1818 ?); Scudd., *Proc. Amer. Ac. Arts & Sci.* x. p. 198 (1875); Kirby, in Allen's *Nat. Libr., Lep. Butt.* ii. p. 272 (1896); Dyar, *Bull. U.S. Nat. Mus.* lii. p. 4. n. 25 (1902) (Florida; "Antilles"); Kirby, in Hübner, *Samml. Exot. Schmett.* ed. ii. p. 91. t. 130. fig. 1. 2 (190—?).

Papilio polydamas, Godart, *Enc. Méth.* ix. p. 39. n. 44 (1819) (citat. Druryi et Sebae excepta); Lacord., *Ann. Soc. Ent. Fr.* ii. p. 384 (1833) (Guyane); Boisd. & Lec., *Hist. Gén. Léop. Amér. Sept.* p. 37 (1833) (synon. *partim*; t. 15. fig. 1. 2 ad subspeciem insulae Guadeloupe pertinet); Lucas, *Léop. Exot.* p. 33. t. 17. fig. 2 (1835); Boisd., *Spec. Gén. Léop.* i. p. 321. n. 162 (1836) (citat. "Boisd. & Leconte" falsa); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 14 (1845); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 20. n. 241 (1846) (*partim*); Poey, *Mem. R. Soc. Ec. Habau* p. 236 (1846); Erichs., in Schomb., *F. F. Brit. Guiana* p. 593 (1848); Kollar, *Denkschr. K. Ak. Wiss. Wien, Math. Naturw. Cl.* i. p. 354. n. 9 (1850) (Venezuela); Lucas, in Chenu, *Enc. Hist. Nat., Pap.* i. p. 38. t. 20. f. 2 (1851-53); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 67. n. 299 (1852) ("var., Jamaica" alia subsp.); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Amazons; everywhere, common); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 77. n. 316 (1856) ("var." excepta); Ménétr., *Enum. Corp. Anim. Mus. Petrop., Léop.* i. p. 6. n. 95 (1857); Lucas, in Sagra, *Hist. Cuba* p. 486 (1857); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 228 (1861) (open ground); id., *Journ. Entom.* i. p. 224. n. 6 (1862) (throughout the Amazons, in cultivated places); Morris, *Synops. Lep. N. Amer.* i. p. 12. n. 18 (1862) (Georgia); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 148 (1863) (*partim*); U.S.A., *Centr. Amer.*; Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 297. n. 119 (1864) ("var." aliae subsp.); Herr-Sch., *Corr. Bl. Regensb.* p. 174. n. 14 (1864) (Cuba, common); Jaeger, *Life N. Am. Ins.* p. 210 (1864); Kirby, *Cat. Diurn. Lep.* p. 521. n. 25 (1871); Butl. & Druce, *Proc. Zool. Soc. Lond.* p. 364. n. 367 (1874) (Costa Rica); Caproun., *Ann. Soc. Ent. Belg.* xvii. p. 9. n. 11 (1874) (Petropolis, Nov., common); Druce, *Proc. Zool. Soc. Lond.* p. 245. n. 6 (1876) (Upper Ucayali); Möschl., *Verh. Zool. Bot. Ges. Wien* xxvi. p. 295 (1876) (Surinam); Edw., *Trans. Amer. Ent. Soc.* vi. p. 11. n. 22 (1877) (Florida; Cuba); Butl., *Trans. Ent. Soc. Lond.* p. 145. n. 226 (1877) (Obydos, January; R. Tapajos, March); Gerh., *Macro-Lep. N. Amer.* p. 25. n. 437 (1878); Streck., *Bull. & Moths N. Am.* p. 67. n. 3 (1878); Dewitz, *Arch. Naturg.* xlv. 1. p. 2. t. 1. fig. 1 (1878) (larva); Hopff., *Stett. Ent. Zeit.* xl. p. 51. n. 12 (1879) (Brazil, Surinam, Venezuela, N. Granada, Peru, Honduras, Mexico, Cuba); Burm., *Descr. Rép. Argent. v. Léop., Atlas* p. 6. n. 13. t. 2. fig. 7. 7A

(1879) (larva, pupa; Buenos Aires); Oberth., *Et. d'Ent.* iv. p. 98. n. 303 (1880) (Mexico; Guyane; Pará); Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 126. n. 244 (1880) (Sta. Marta); Gosse, *Entom.* xiii. p. 193 (1880) (Assuncion, Dec. to March, not uncommon); Gundl., *Papilio* i. p. 113 (1881) (Cuba); id., *Ent. Cubana* p. 121 (1881) (*partim*; Cuba, larva, pupa); Edw., *Papilio* ii. p. 122 (1882) (Florida); id., *Canad. Ent.* xiv. p. 120 (1882) (Florida); Walk., *Ent. Mo. Mag.* xix. p. 26 (1882) (Panama, not rare); Auriv., *K. Sv. Vet. Ak. Handl.* xix. 5. p. 16. n. 11 (1882) (recensio critica); Müller, *Kosmos* xii. p. 448 (1883) (metam.; pupa brown or green, no intergradations); Meldola, *Proc. Ent. Soc. Lond.* p. 23 (1883) (colour of pupae and larvae); Jones, *Proc. Lit. Philos. Soc. Liverp.* p. 16. n. 77 (1883) (metamorph.); Heezko, *Proc. Ent. Soc. Lond.* p. 24 (1884) (drinking); Staud., *Erot. Taqf.* i. p. 12. t. 8. ♂ (1884); Edw., *Bull. U.S. Nat. Mus.* xxxv. p. 13 (1889) (liter. of transf.; *partim*); Godm. & Salv., *Biol. Centr. Amer.*, *Rhop.* ii. p. 200. n. 15. t. 65. fig. 14. genit. (1890) (Mexico to Panama; "S. Domingo, Jamaica, St. Thomas" aliae subsp.); Sharpe, *Proc. Zool. Soc. Lond.* p. 555. n. 1 (1890) (Prov. of Goyaz); Habnel, *Iris* iii. p. 203 (1890) (Valera); Maass. & Weym., in Stübel, *Reisen S. Amer.*, *Lep.* p. 11. n. 37 (1890) (Colombia); iid., *l.c.* p. 34. n. 29 (1890) (Pitol, Colombia); Seitz, *Stett. Ent. Zeit.* li. p. 98 (1890) (Coreovado); Mayn., *Mon. N. Amer. Butt.* p. 15. n. 22. fig. 9A (1891) (Cuba; Mexico; occasionally Florida); Haase, *Untersuch. Mimicry* p. 75 (1893); Michael, *Iris* vii. p. 214 (1894) (Sao Paulo de Olivença); Böouingh., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 28 (1895) (Rio de Janeiro, very common); Weym., *Stett. Ent. Zeit.* lv. p. 312. n. 1 (1895) (Rio Grande do Sul); Mabilde, *Guia pract. Borbolet.* *Rio Grande do Sul* p. 43. t. 1. fig. 2A. B. C (1896) (larva, pupa, imago); Peters, *Illustr. Zeitschr. Ent.* ii. p. 52 (1897) (Nova Friburgo, larva, pupa); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 273 (1897) (Florida); Holland, *Butt. Book* p. 316. n. 21. t. 41. fig. 4 (1899); Denton, *Moths Butt. U.S.* p. 355. fig. (1898-1900); Prinz. Therese, *Berl. Ent. Zeitschr.* xxxv. p. 240. n. 1 (1901) (Palmer, W. Ecuador, 100 m., Aug. 19; R. Negro, Juli); Kaye, *Trans. Ent. Soc. Lond.* p. 206. n. 193 (1904) (Trinidad); Weeks, *Illustr. Diurn. Lep.* p. 20 & 28 (1905) (Bolivia).

♂♀. There is considerable individual variation in the size of the spots composing the band of the upperside of fore- and hindwing. The range of this species is enormous; in fact, *P. polyd. polydamas* is the most widely distributed American *Papilio*. The insect reminds one in this respect of the African *P. demodocus demodocus*, which occurs as such all over the African continent south of the Sahara. Both species, which belong to widely different groups of *Papilio*, have further in common that their distribution depends apparently to a great extent on the ground being cleared of forest for cultivation, both species being essentially inhabitants of open country.

The only approach to a division of this subspecies into two geographical races which we can find is the frequent reduction of the red submarginal spots on the underside of the hindwing in Cuban specimens, these spots being partly shaded over with black.

Genitalia: Harpe bifurcate, the two processes of about the same size and shape, pointed, curved, horn-shaped, the ventral one bearing usually some minute teeth proximally.

Hab. Cuba; Georgia southward to Buenos Aires.

In the Tring Museum several larvae and pupae, and 230 odd specimens from: Cuba; many places in Central and South America; from East and West Mexico southwards to Argentina.

In a crippled female from Barbados in the British Museum the red submarginal spots on the underside of the hindwing are rather larger than they are in average specimens of *P. polyd. polydamas*. There may be a special form on Barbados; but more and better specimens are required for comparison with *P. polyd. polydamas*.

g. P. polydamas lucayus subsp. nov.

♂♀. Band of upperside broad.—Underside of hindwing paler than in *P. polyd. polydamas*, yellowish white anal bar larger, usually extending forward

to M¹, reaching at least beyond M²; red submarginal spots of the same irregular shape as in the continental form, but larger.

Hab. Bahamas: Nassau and New Providence.

In the British Museum (name-type) and in coll. F. D. Godman.

h. P. polydamas polyrates Hopff. (1866).

Papilio Eques Trojanus polydamas var., Esper, *Aust. Schmelt.* p. 33. n. 12. t. 7. fig. 1 (1784).

Papilio polydamas. Méuétrics, *Bull. Moscou* ii. p. 233. n. 1 (1832) (Haiti; common); Dewitz, *Stett. Ent. Zeit.* xxxviii. p. 234. n. 3 (1877) (Porto Rico, common); Hahnel, *Iris* iii. p. 134 (1890) (Porto Rico); Möschl., *Abh. Senkenb. Nat. Ges.* xvi. p. 91. n. 3 (1891) (Porto Rico, common); Gundl., *An. Hist. Nat. Madrid* xx. p. 114. n. 3 (1891) (Porto Rico; synonym *partim*).

Papilio polydamas var., Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 77. sub n. 316 (1856) (*partim*; S. Domingo); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 297. n. 119 (1864) (*partim*; S. Domingo).

Papilio polyrates Hopffer, *Stett. Ent. Zeit.* xxvii. p. 24. n. 4 (1866) ("Pará" error loci).

Papilio polydamas var. *P. polyrates*, Kirby, *Cat. Diurn. Lep.* p. 521. sub n. 25 (1871) ("Antilles").

Papilio hypodamas Guenée, *Mém. Soc. Phys. Hist. Nat.* xxii. p. 371. n. 3 (1872) (Haiti); Kirby, *Pet. Nouv. Ent.* p. 239 (1872) (= *polyrates* Hopff.); id., *l.c.* p. 309. n. 25 (1877) (= *polyrates*).

♂ ♀. Upper- and underside of both wings deeper in tint than in *P. polyd. polydamas*. Band of forewing, upperside, a little more proximal, and that of hindwing less curved, than in *P. polyd. polydamas*, the spot M¹—M² of this band being more distad than in *polydamas*; the anal spot standing proximally of the anal marginal sinus is always small, often vestigial. Size of spots of both wings somewhat variable, the spots of hindwing being in some specimens only half as broad as in others. Red submarginal spots of hindwing below usually larger than in *P. polyd. polydamas*, the silvery white spots attached to spots SC²—R³ large; black discal area mostly touching cell at R¹, much deeper black than in *P. polyd. polydamas*; spots of forewing paler than in *P. polyd. polydamas*, creamy white.

Genitalia: Harpe with one curved process only, the upper process being absent; the process bears one or two teeth on the hindside.

Hab. Haiti.—Porto Rico (this form?).

We have not seen specimens from Porto Rico.

In the Tring Museum 8 ♂♂, 1 ♀.

A series from Port au Prince in coll. Charles Oberthür.

i. P. polydamas jamaicensis subsp. nov. (Pl. VII. fig. 40).

Sloane, *Tring. Jamaica* ii. p. 216. t. 239. fig. 19. 20 (1725).

Papilio polydamas var., Doubleday, *List Lep. Ins. Brit. Mus.* i. p. 14 (1845) (Jamaica); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 20. n. 241 (1846) (*partim*; Jamaica); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 67. sub n. 299 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 77. sub n. 316 (1856); Batl., *Cat. Diurn. Lep. descr. Fabr.* p. 237. n. 14 (1869) (Jamaica); id., *Proc. Zool. Soc. Lond.* p. 481. n. 33 (1878) (Jamaica).

Papilio polydamas var. *polyrates*, Cockerell (*non* Hopffer, 1866, err. det.), *Jamaica Instit.* i. p. 27 (1891) (larva); Fox & Johns., *Ent. News* iv. p. 3 (1893) (Jamaica).

Papilio polyrates, Robinson, *ibid.* xiv. p. 18 (1903) (Jamaica).

♂ ♀. Close to *P. polyd. polyrates* from Haiti, differing in the rufous brick-red spots of the underside of the hindwing being larger and the white spots attached to them smaller, the fourth red spot being usually without a vestige of white at its hinder end, and the fifth and sixth spots mostly without any white scales at both ends.

Hab. Jamaica.

In the Tring Museum 4 larvae, 1 pupa, 10 ♂♂, 6 ♀♀.

j. *P. polydamas thyanus* subsp. nov.

Papilio Eques Trojanus polydamas, Esper, *Aust. Schmett.* p. 33. n. 12. t. 6. fig. 2 (1784).

Papilio polydamas var., Gray, *List Lep. Ins. Brit. Mus. i. Pap.* p. 77. sub n. 316 (1856) (*partim*; St. Thomas).

This form stands much nearer *P. polyd. polydamas* than do the subspecies from Haiti and Jamaica, though geographically *polyd. thyanus* is farther away from *polyd. polydamas*. Esper's figure, *i.e.*, agrees better with this subspecies than with any other we know.

♂ ♀. *Upperside* as in *polyd. polydamas*; distal margin of forewing a little more strongly scalloped, tooth R^3 of hindwing rather prominent.

Underside, hindwing: submarginal spots rufous brick-red, much paler and much larger than in *polyd. polydamas* and not quite so close to the margin, these spots even paler than in the Jamaica subspecies, and as irregular in shape as in *polyd. polydamas*; the white spots attached to second, third, and fourth spot not quite so large as in the Haiti subspecies; the black band situated at the proximal side of the red spots ill-defined, much narrower than in the Jamaica and Haiti forms, and much deeper black than in *polyd. polydamas*; a long yellowish white costal streak or (instead) dispersed yellowish white scales situated along costal margin from praecostal spur to three-fourths; a heavy creamy white bar proximally of red anal spot.

Genitalia as in *polyd. polydamas*; the two processes of the harpe short and stout.

Hab. St. Thomas.

In the Tring Museum 2 ♂♂ (E. Hartert). A pair in the British Museum; a male in coll. F. D. Godman.

k. *Papilio polydamas antiquus* subsp. nov.

Papilio Eques Trojanus polydamas, Drury, *Illustr. Exot. Ins. i.* p. 32. t. 17. fig. 1. 2 (1770) (Antigua).

Known to us only from Drury's figure, which comes near the form from St. Thomas, but does not agree with it.

♂. *Upperside*, forewing: a band of well separated spots from SC^1 to inner margin, the upper four spots small, the sixth, which is the largest, shorter than its distance from margin.—Hindwing: band narrower than in the St. Thomas form, the black marginal area being one-third broader; anal spot as large as in *thyanus*.

Underside, forewing: three small dots SC^1-R^2 , the other spots larger than above.—Hindwing: submarginal spots rufous brick-red as in the St. Thomas form, large, the white silvery spots attached to the second to fourth spots smaller than in our St. Thomas specimens.

Hab. Antigua.

In the following two species the abdomen is yellowish white above in the male, the first segment and the claspers excepted, the scales being tongue-shaped, entire, while in the female the upperside is blackish green, the scales being dentate. The head, thorax, and underside of the abdomen are long-hairy, the sterna, coxae, and femora being greenish yellow like the sides of the abdomen. The abdominal sternites are dotted with white like the palpus, but these dots are often indistinct on account of the hairiness of the body. The cell of the hindwing is rather shorter

and more rounded than in *P. belus* and allies. The underside of the hindwing is greenish yellow from the base to the black discal band, the upper scales in this basi-discal area being greenish yellow and the underscales blackish brown. The claws of the hindtarsus are nearly symmetrical.

Scent-scales ochraceous yellow.

52. *Papilio philetas* Hew. (1869).

Papilio philetas Hewitson, *Trans. Ent. Soc. Lond.* p. 31 (1869) (Ecuador); id., *Erol. Butt.* iv. *Pap.* t. 11. fig. 35. 36. ♂ (1869); Kirby, *Cat. Diurn. Lep.* p. 522. n. 32 (1871) (Ecuador); Haensch, *Berl. Ent. Zeitschr.* xlviii. p. 152 (1903) (Baños, R. Pastaza).

♂ ♀. Sexes similar, apart from abdomen. There is little variability in pattern; the spots in the costal region on the upperside of the forewing are sometimes minute. The species is easily recognised by the row of red spots on the disc of the hindwing below.

Scent-organ: Scales of densely scaled streak three or four times as long as broad, those situated between this streak and the abdominal edge being much less elongate.

Genitalia: ♂. Harpe broader than long, strongly but gradually narrowed apicad, apex bifid, each angle being produced into a long curved hornlike tooth, dorsal edge of harpe with some small teeth proximally.—♀ not dissected.

Early stages not known.

Hab. Eastern Ecuador; North Peru.

In the Tring Museum 22 ♂♂, 1 ♀, from: Loja; Zamora (O. T. Baron); Baños (R. Haensch).

In coll. Charles Oberthür a series from Ambato, Ecuador, and from Chachapoyas, Peru.

In coll. Paul Dognin both sexes from Loja. In the British Museum from Nauta, Loreto, Peru.

53. *Papilio madyes* Doubl. (1846).

Papilio madyes Doubleday, *Ann. Mag. N. H.* xviii. p. 375 (1846) (♀, Bolivia); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 66. n. 296. t. 6. fig. 4. ♀ (1852) (fig. of type).

♂ ♀. Sexes similar, apart from abdomen; female a little less metallic than male. The red spots on the underside of the hindwing of *P. philetas* are in *P. madyes* replaced by greenish yellow ones, which are more or less completely merged together with the submarginal greenish yellow patches. The scales of the forewing, above, are more heavily denticulate than in *P. philetas*. There is considerable geographical variation in this insect.

Scent-organ: Scales ovate, or broadly ovate, or asymmetrical, one side being reduced.

Genitalia: ♂. Harpe triangular, the apex produced into an acute, curved, hornlike tooth, a similar but much smaller tooth at the ventral proximal corner, occasionally accompanied by a minute tooth.—♀. Vaginal lobes longer than broad, separate, not carinate on hindside; spines situated proximally on anal segment heavy.

Early stages not known.

Hab. Peru and Bolivia.

Five subspecies.

a. *P. madyes plinius* Weym. (1890).

Papilio plinius Weymer, in Stübel, *Reisen S. Amer.*, *Lep.* p. 73. n. 14, p. 125. n. 42. t. 1. fig. 1. ♂ (1890) (North Peru, between Tambo Almirante and Pucatanbo).

♂. Only one specimen known; apparently somewhat discoloured. *Upperside* brighter green than in the other subspecies; forewing with only four small white spots from R^2 to SM^2 ; spots of hindwing about the same size as in the next form, but more sharply defined (? according to figure).

Underside, forewing: no indication of the distal spots SC^3-R^2 .—Hindwing ochre-yellow; submarginal spots small, curved, the second to fourth \cup -shaped.

Hab. North Peru: Chachapoyas-Moyobamba district.

b. *P. madyes chlorodamas* Guen. (1872) (Pl. VII., fig. 39).

Papilio chlorodamas Guenée, *Mém. Soc. Phys. Hist. Nat. Genève* xxii. p. 369. n. 1. fig. 1. ♂ (1872) (Peru; "♀," errore).

Papilio madyes (!), Kirby, *Pet. Nouv. Ent.* p. 239 (1872) (*chlorodamas* = *madyes* (!), errore).

Papilio madyes, id., *Cat. Diurn. Lep.* p. 809. n. 22 (1877); Druce, *Proc. Zool. Soc. Lond.* p. 245. n. 5 (1876) (Peru: Huira, Santana); Hopff, *Stett. Ent. Zeit.* xl. p. 51. n. 11 (1879) (*partim*; Chanchamayo; "*chlorodamas* is ♂ of *madyes*; Chanchamayo specimens smaller than Bolivian ones"); Oberth., *Et. d'Ent.* iv. p. 97. n. 299 (1880) (Peru).

Papilio madyes var. *nursyas* Staudinger, *Iris* vii. p. 59 (1894) (Chanchamayo).

♂♀. Spots on upperside of fore- and hindwing large, those on forewing either yellowish (most ♂♂) or white (♂, ♀).

Scent-scales ovate.

Hab. Eastern Central Peru: Departments of Huánuco and Junin.

In the Tring Museum: 47 ♂♂, 2 ♀♀, from: Huancabamba, Cerro de Pasco (Böttger); Pozuzo, Cushi, and Chanchamayo (W. Hoffmanns); Río Toro (Simons).

c. *P. madyes crispus* subsp. nov. (Pl. VII. fig. 43).

Papilio madyes, Staudinger (*non* Doubl., 1846, err. det.), *Exot. Tagf.* i. p. 12 (1884) (*partim*; S. Peru).

♂. *Upperside*, forewing: spots much reduced, those at apex of cell vestigial; of the small distal spots SC^3-R^2 only the one in subcostal fork distinct, spots R^2-SM^2 less than half the size of the spots of *chlorodamas*.—Hindwing: submarginal spots very small as compared with those of *chlorodamas*.

Underside: apical area of forewing densely powdered with yellowish scales, the yellow and the brown scales almost regularly alternating; greenish yellow submarginal spots on the whole somewhat smaller than in *chlorodamas*.

Hab. South-East Peru: Cuzco.

Resembles on the upperside the following subspecies, the spots of the forewing, however, standing a little farther away from the margin.

In the Tring Museum: 3 ♂♂ from Callanga, 1500 m. (Garlepp).

In coll. F. Ducane Godman a male from Santa Ana, Cuzco (Whitely).

d. *P. madyes madyes* Doubl. (1846).

Papilio madyes Doubleday, *l.c.* (1846) (Bolivia); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 20. n. 243 (1846); Doubl., *List Lep. Ins. Brit. Mus.* i. *Append.* p. 4 (1848); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 66. n. 296. t. 6. fig. 4. ♀ (1852) (Bolivia); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 76. n. 313 (1856) (Bolivia); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 297. n. 115 (1864) (Bolivia); Kirby, *Cat. Diurn. Lep.* p. 521. n. 22 (1871) (Bolivia); Hopff, *Stett. Ent. Zeit.* xl. p. 51. n. 11 (1879) (*partim*; Moxos in Bolivia); Staud., *Exot. Tagf.* i. p. 12 (1884) (*partim*; Bolivia); Haase, *Untersuch. Mimicry* i. p. 76 (1893); Staud., *Iris* vii. p. 59 (1894) (Cocapata, Bolivia); Weeks, *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumai, Bolivia).

♂ ♀. Veins on *underside* of hindwing streaked with black.

Scent-organ: most of the scales asymmetrical, one side being reduced in width.

Hab. Bolivia.

In the Tring Museum 7 ♂♂ from: R. Unduawe, 2000 m., February 1901 (Simons); Chulumani, 2000 m., January 1901, wet season (Simons); Yungas de La Paz, 1000 m., November 1899 (Garlepp).

In coll. F. D. Godman from Coroico, Bolivia, 6500 ft. (Garlepp).

e. P. madyes tucumanus subsp. nov.

♂ ♀. *Upperside*, forewing: spots R¹—SM² on the whole a little larger and a little more sharply defined than in *P. m. madyes*.

Underside, forewing: the band of spots sharply defined, forked, the apical area not being suffused with pale primrose-yellow, the interspace between the proximal and distal costal bands and the distal margin of the wing being brown, the brown border anteriorly wider than the submarginal spots, gradually becoming narrower posteriorly.—Hindwing: basi-discal area smoky, appearing washed with fawn-colour; veins black as in *P. m. madyes*; black discal band wider than in the Bolivian subspecies; greenish yellow submarginal spots smaller.

Hab. Tucuman, Argentina.

In the Tring Museum 3 ♂♂, 1 ♀, from: Tucuman (J. Steinbach).

A ♂ in coll. F. D. Godman from Bueyes, Bolivia (Garlepp).

A ♀ from Tucuman (Kinkelin coll.) in coll. Charles Oberthür.

54. *Papilio polystictus* Butl. (1874).

Papilio protodamas (?) Godart, *Enc. Méth.* ix. p. 40. sub n. 46. ♂ (1819) ("pourrait bien être le mâle de *protodamas*"!; Brazil).

Itobalus protodamas, Hübner (*non* Godart 1819, err. det.), *Samml. Exot. Schmett.* ii. t. 115. fig. 1. 2. ♂ (1822?).

Papilio polystictus Butler, *Trans. Ent. Soc. Lond.* p. 435 (1874).

Papilio protodamas, Burmeister *Descr. Rép. Argent. v. Lép., Atlas* p. 6. n. 12. t. 2. fig. 6. 6A (1879) (larva, pupa).

Godart described *P. protodamas* from a female, adding the description of a male *Papilio*, which, he says, might perhaps be the male of that female. As these two specimens belong to different species, there can be no doubt whatever that the name *protodamas* has to be applied to the species to which that female belongs. Following the lead of Hübner, who erroneously restricted the name *protodamas* to the male of Godart and renamed the other species *hyperion*, all authors have treated the present insect as being the true *protodamas* of Godart. The species is geographically variable in the size of the markings on the upperside of the wings. Butler, in 1874, separated the small-spotted form as a distinct species, calling it *polystictus*, from the large-spotted form, which he considered to be typical *protodamas*. Though Butler was wrong in creating a new "species," his name *polystictus* is nevertheless valid for the species, being the first name originally given to individuals of the present species only. The so-called *protodamas*, namely the large-spotted form, requires a new name, having remained without a valid name of its own.

♂ ♀. Forewing with three to seven grey-green submarginal spots on upperside, and occasionally a streak behind SM², spot M²—SM² double, all more or less angle-shaped; the corresponding spots of the underside large, greyish white, apex

of cell and the disc beyond being suffused with greyish white; scales of upperside entire, somewhat fan-shaped, being almost gradually widened, with the apex rounded as in *P. laodamas*, *belus*, etc.—Hindwing: scales of upperside nearly all entire, those in anal area being denticulate; two rows of grey-green or greenish yellow spots; the discal spots more or less ovate, often mere dots, sometimes vestigial, the middle ones usually of almost even size, the first, second and last being generally smaller than the others; the submarginal spots angle-shaped, the upper ones being reduced to dots in many specimens; red submarginal spots of underside resembling those of *P. laodamas* and *polydamas*; no white dots distally of them.

Scent-organ: scales twice or $2\frac{1}{2}$ times as long as broad, strongly striate, mostly somewhat asymmetrical.

Genitalia of the same type as in *P. belus*.

Early stages described and figured by Burmeister, *l.c.*

Hab. Brazil; Paraguay; and Argentina.

The report of an occurrence of this species near Buenos Aires (Burmeister) is confirmed by a female in coll. Charles Oberthür collected by Kinkelin at Zarate.

Two subspecies:

a. P. polystictus janira subsp. nov.

Papilio protodamas (!) Godart, *l.c.* ♂ (1819).

Ithobalus protodamas, Hübner (*non* Godart, 1819, err. det.), *l.c.* (1822?); Kirby, *ibid.* ed. ii. p. 91. t. 328. fig. 1. 2 (190—?).

Ithobatus (!) *protodamas*, Charpentier, in Esper, *Aust. Schmett. i. Zusätze* p. 13 (1831).

Papilio protodamas, Boisduval, *Spec. Gen. Léop.* i. p. 322. n. 164 (1836) (Rio de Janeiro); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 14 (1845) (Brazil); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 20. n. 244 (1846) (Brazil); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 67. n. 302 (1852) (Brazil); id., *List Lep. Ins. Brit. Mus. i. Pap.* p. 78. n. 319 (1856) (Rio de Janeiro; "var." excl.); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Léop.* i. p. 6. n. 96 (1857) (Brazil); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 297. n. 120 (1864) (Brazil; "var." excl.); Capronn., *Ann. Soc. Ent. Belg.* xvii. p. 9. n. 10 (1874) (Gavia, Aug.; Entre Rios, Sept.; Botafogo, Nov.); Oberth., *Et. d'Ent.* iv. p. 98. n. 306 (1880) (Brazil); Bönnigh., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 28 (1895) (Petropolis, common).

♂♀. Submarginal spots of upper- and underside of forewing and discal ones of upperside of hindwing larger than in the following form.

In some individuals the discal spots of the hindwing are so large that the middle ones extend close to cell. Most males have seven distinct submarginal spots on the upperside of the forewing, while in the females the upper two or three spots are usually missing.

Hab. Province of Rio de Janeiro; Minas Geraës.

In the Tring Museum 25 ♂♂, 10 ♀♀, from: Minas Geraës (R. Haeusch); Nova Friburgo; Petropolis, November 1897, January 1898 (Foetterle); Rio de Janeiro.

b. P. polystictus polystictus Butl. (1874).

Papilio protodamas var. *b.*, Gray, *List Lep. Ins. Brit. Mus. i. Pap.* p. 78. sub n. 319 (1856).

Papilio polystictus Butler, *Trans. Ent. Soc. Lond.* p. 435 (1874) (Rio Grande; Espirito Santo); Kirby, *Cat. Diurn. Lep.* p. 814 (1877); Weym., *Stett. Ent. Zeit.* lv. p. 312. n. 2 (1895) (Rio Grande do Sul).

Papilio protodamas, Burmeister, *Descr. Rép. Argent. v. Léop.*, *Atlas* p. 6. n. 12 (1879) (*partim*; (Buenos Aires); Jones, *Proc. Lit. Philos. Soc. Liverpool* p. 17. n. 83 (1883) (larva, pupa; forest); Haase, *Untersuch. Mimicry* i. p. 76 (1893) (South Brazil).

Papilio neodamas, Mabilde (*non* Lucas, 1852, err. det.), *Guia pract. Borbot. Rio Grande do Sul* p. 43 (1896).

♂ ♀. Spots on upperside of wings reduced in size, especially the discal series of hindwing; the upper two or three spots of the forewing vestigial or missing in most individuals. Specimens with exceptionally large spots scarcely distinguishable from *janira* specimens with exceptionally small markings.

Hab. Brazil: Sao Paulo southward to Rio Grande do Sul; Paraguay; Buenos Aires.

In the Tring Museum 1 pupa, 21 ♂♂, 11 ♀♀, from: Castro, Parana (E. D. Jones); S. Catharina; Rio Grande do Sul; Yhu, Paragnay, December 1896 (Audeer); Sapucay, Paraguay, October to February, June (W. Foster).

55. *Papilio eracon* Godm. & Salv. (1897).

Papilio eracon Godman & Salvin, *Trans. Ent. Soc. Lond.* p. 248 (1897) (Colima, Mexico); *ibid.*, *Biol. Centr. Amer., Rhop.* ii. p. 729. n. 18 (u). t. 111. fig. 11. 12. ♂ (1901) (Colima).

♂ ♀. Wings, *upperside*: forewing with a submarginal row of four to seven spots from hindmargin forward, the spots gradually decreasing in size.—Hindwing: an evenly curved row of spots placed (in centre) halfway between cell and distal margin, the upper two spots the smallest, the others of about equal size, the band broader in female than in male; a row of admarginal spots, being the remnants of transverse bars.

On *underside* a row of heavy transverse red bars on hindwing, the upper bars bearing at costal side a silvery spot, at the distal side of which there is a rather large creamy admarginal dot, in cellule R³—M² two silvery dots and two creamy ones, in cellule M¹—M² the silvery and the creamy dot standing at posterior end of red bar—*i.e.* at vein M², not at M¹.

Scent-organ: a streak of dense erect scaling as in the allied species, the scales twice as long as broad or less, multistriate, nearly as broad at base as at apex.

Genitalia as in *P. belus*, tenth tergite a little slenderer.

Early stages not known.

Hab. West Mexico: Colima and Guerrero.

In the Tring Museum 2 ♂♂ from Guerrero (O. T. Baron).

In the British Museum a pair from "Mexico" (coll. Crowley).

In coll. Adams 3 ♂♂ without special locality.

56. *Papilio belus* Cram. (1777).

Papilio Eques Achivus belus Cramer, *Pap. Exot.* ii. p. 23. t. 112. fig. A. B. ♂ (1777) (Surinam).

Papilio Eques Achivus numitor *id.*, *l.c.* p. 25. t. 113. fig. B (1777) (Surinam).

Papilio Eques Trujanus amulius Esper, *Aust. Schmelt.* p. 113. n. 48. t. 27. fig. 1. ♀ (1792); Martyn, *Psyche* t. 1. fig. 1. t. 2. fig. 1 (1797) (*ined.*).

Papilio varus Kollar, *Denkschr. K. Acad. Wiss. Wien, Math. Nat. Cl.* i. p. 354. n. 8. t. 42. fig. 5. ♀ (1850) (Cundinamarca, Colombia).

We have not seen a specimen agreeing with Esper's or Martyn's figures of *amulius*, in which the submarginal spots on the underside of the hindwing are yellow instead of red. We believe this insect to be a xanthochromatic female of *belus*. Martyn's figure is better than that of Esper. The yellow spots on the upperside of the hindwing as shown in Martyn's figure are rather often found in females of *belus*, but are not so pure yellow.

♂. Scaling of body and wings practically as in *P. lycidas*. No white streak along abdominal fold of hindwing, red spots on underside farther away from margin than in *P. lycidas*, accompanied by white admarginal dots, which are

rarely vestigial; the number of white discal patches on upperside variable from one to seven, the first always large, often occupying half the cellule C—SC², but never extending to base as in *P. crassus*, the others smaller and usually more greenish, very variable in size, the scales composing them lying on top of the metallic scales (as in *P. lycidas*), less acuminate than in *P. lycidas*; SC² on the whole branching off from cell a little more proximally than in *P. lycidas*.

♀. Dichromatic; the ordinary form similar to the male except in the abdomen being metallic green above and the forewing bearing often some submarginal spots on upperside; the rarer form bearing a large buffish yellow patch on forewing occupying apex of cell and the adjacent portions of the disc.

Scent-organ: scales geographically variable, very close together, erect, either about four times as long as broad, slightly curved, obtuse at apex and faintly or not at all denticulate, somewhat cucumber-shaped, but compressed, though not quite flat as ordinary scales; or even shorter than in *P. lycidas*; or of intermediate size.

Genitalia: ♂. Harpe small, short, triangular, with the apex strongly rounded; ventral margin dilated into an acuminate lobe which stands vertically on the plane of the harpe; this lobe curved basal, denticulate at distal edge.—♀. Hairy lobes of vaginal cavity larger than in *P. lycidas* and the postvaginal tubercle higher.

Early stages not known.

Hab. Mexico to Bolivia, eastwards to Pará; not in Brazil proper, but may be expected to occur in the province of Goyaz.

Five subspecies.

If the figure of *P. nunitor* Cram., *l.c.*, does not represent a specimen of *P. lycidas*, it represents a specimen of *P. belus belus* with spots on the disc of the hindwing. There is no white streak on the hindwing of the figure, as there is in *P. lycidas*, but the artist may have forgotten to put that streak in.

a. P. belus chalceus subsp. nov.

♂. Wings, *upperside*: hindwing deeper green at distal margin than on disc; within this marginal area a row of angle-shaped submarginal spots of the same green colour as the disc; discal row of creamy white spots similar in position to that of the Bolivian form, *P. belus cochabamba*, the row being straight or only faintly curved from SC² to abdominal margin, spots from R¹ backwards small, spot R¹—R² farther away from cell than spot R²—R³.

Underside, forewing: white fringe-spots as distinct as above.—Hindwing: red submarginal bar C—SC² sharply marked (absent from the other forms or vestigial); white admarginal dots very distinct.

♀ not known.

Scent-organ: scales very short, being partly broader than long, cup-shaped, proximally strongly rounded, striation heavy, the apical edge appearing multidentate.

Hab. Guerrero, West Mexico (O. T. Baron).

Four ♂♂.

b. P. belus varus Koll. (1850).

Papilio varus Kollar, *Denkschr. K. Ak. Wiss. Wien, Math. Nat. Cl.* i. p. 354. n. 8. t. 42. fig. 3. 4. ♀ (1850) (Cundinamarca, Colombia); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* ii. p. 529 (1852); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 68. n. 308 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 79. n. 325 (1856); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 297. n. 124 (1864) (*partim* N. Granada).

Papilio nunitor, Gray (*non* Cramer, 1777, *err. det.*), *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 68. n. 305 (1852) (Venezuela); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 78. n. 322 (1856) (Venezuela); Bates

Ent. Mo. Mag. i. p. 2 (1864) (Guatemala); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 202. n. 17. t. 66. fig. 1. ♀, 2. 3. ♂ (1890) (Guatemala; Nicaragua; Costa Rica); *id.*, *l.c.* p. 728 (1901) (Honduras).

Papilio latinus Felder, *Wien. Ent. Mon.* v. p. 72 n. 2 (1861) (Mérida, ♀;—Mns. Tring); *id.*, *Verh. Zool. Bot. Ges. Wien* xiv. p. 298. n. 126 (1864) (Venezuela; Bogotá); *id.*, *Reise Novara, Lep.* p. 39. n. 28. t. 10. fig. b. ♂ (1865) (Bogotá; Mérida); Kirby, *Cat. Diurn. Lep.* p. 522. n. 29 (1871) (Amer. Centr.); Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 126. n. 243 (1880) (Sta. Marta); San Estéban; N. Granada); Oberth., *Et. d'Ent.* iv. p. 98. n. 308 (1880) (Panama; Colombia; San Estéban); Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 126. n. 243 (1880) (Sta. Marta); Habel, *Iris* iii. p. 203 (1890) (Valera); Maass. & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 11. n. 38, and p. 31. n. 124 (1890) (Colombia); Haensch, *Berl. Ent. Zeitschr.* xlviii. p. 154 (1903) (Arebidona, E. Ecuador, 640 m.).

♂. Hindwing, *upperside*: distal margin of the same colour as the disc, or, if darker, not bearing distinct paler green submarginal angle-shaped spots; an evenly curved row of discal spots, variable in size, but always gradually diminishing in size from spot SC²—R¹ backwards, the number being usually four or five, seldom seven, rather often two, inclusive of the large costal patch. Six red submarginal spots on *underside*, there being no spot between C and SC² or only a vestige of it.

♀. Dimorphic.

a. ♀-f. *latinus* Feld., *l.c.*—Forewing with three or four submarginal spots, enlarged on underside, where the upper ones are usually elongate arrowhead-shaped.—Hindwing: distal edge darker than disc, this border proximally crenate, limited by some creamy scales forming more or less distinct dots or curved bars; an evenly curved band of five or six spots, gradually diminishing in size, the first and second of about the same size, the last minute.

b. ♀-f. *varus* Kollar, *l.c.*—Forewing with large yellowish patch occupying apex of cell and adjacent portions of disc.

Scent-organ: scales elongate, gradually widened, the larger proportion of them about three or four times as long as broad, somewhat curved, not or very feebly denticulate, the scales from the distal part of the fold being especially long.

Hab. Guatemala southward to North-East Ecuador and North Venezuela.

In the Tring Museum 27 ♂♂, 5 ♀♀, from: San Pedro Sula, Honduras; Chiriqui; "Bogota"; Purnio, R. Magdalena, November 1896 (Dr. Bürger); Archidona (Goodfellow); Mérida and Tachira (Briceño); Mérida (type of *latinus*, ex coll. Felder).

A specimen of ♀-f. *varus* in Brit. Mus. from "Bogota" (Crowley bequest).

c. *P. belus belus* Cram. (1777).

Papilio Eques Achirus belus Cramer, *l.c.* (1777) (Surinam); Goeze, *Ent. Beytr.* iii. 1. p. 85. n. 57 (1779).

Papilio Eques Achirus nuntior *id.*, *l.c.* (1777) (Surinam); Goeze, *l.c.* p. 82. n. 45 (1777).

Papilio Eques Trojannus belus, Fabricius, *Spec. Ins.* ii. p. 9. n. 34 (1781) (*partim*); *id.*, *Mont. Ins.* ii. p. 5. n. 36 (1787) (*partim*); Jabl. & Herbst, *Naturs. Schmett.* ii. p. 95. n. 27. t. 11. fig. 1. ♂ (1784) (*partim*); Gmelin, *Syst. Nat.* i. 5. p. 2233. n. 294 (1790) (*partim*); Fabr., *Ent. Syst.* iii. 1. p. 17. n. 53 (1793) (*partim*).

Papilio Eques Trojannus nuntior Esper, *Ausl. Schmett.* p. 81. sub n. 35, p. 114. n. 49. t. 27. fig. 2 (1792).

Papilio Eques Trojannus amulius *id.*, *l.c.* p. 113. n. 48. t. 27. fig. 1. ♀ (1792).

Ithobalus belus, Hübner, *Verz. bek. Schmett.* p. 88. n. 915 (1818?).

Ithobalus nuntior, *id.*, *l.c.* p. 88. n. 918 (1818?).

Papilio belus, Godart, *Enc. Méth.* ix. p. 38. n. 42 (1819) (*partim*); Lacord., *Ann. Soc. Ent. Fr.* ii. p. 384 (1833) (Godart's *belus* = *belus*, *crassus* and *crymanthus*); Boisd., *Spec. Gén. Léop.* i. p. 315. n. 154 (1836) (Surinam); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 20. n. 233 (1846) (Surinam); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 68. n. 303 (1852) (Ega; eit. Lucas

- excl.); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Amazons); Gray, *List Lep. Ins. Brit. Mus.* i. Pap. 78. n. 320 (1856) (Ega); Ménétr., *Étun. Corp. Anim. Mus. Petrop., Lép.* i. p. 6. n. 92 (1857) ("Brazil"); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 227 (1861); id., *Journ. Entom.* i. p. 223. n. 2 (1862) (Upp. Amazons; Guiana); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 298. n. 128 (1864) (Surinam; Upp. Amazons); Butl., *Cat. Diurn. Lep. descr. Fabric.* p. 238. n. 15 (1869) (Peru); Kirby, *Cat. Diurn. Lep.* p. 522. n. 30 (1871) (Surinam; Upper Amazons); Druce, *Proc. Zool. Soc. Lond.* p. 245. n. 8 (1876) (Peru); Butl., *Trans. Ent. Soc. Lond.* p. 145. n. 227 (1877) (R. Jutahi, Feb.); Hopff., *Stett. Ent. Zeit.* xl. p. 51. n. 13 (1879) (Brazil, Surinam, Peru); Oberth., *Et. d'Ent.* iv. p. 98. n. 309 (1880) (Guyane; Toffó); Möschl., *Verh. Zool. Bot. Ges. Wien* xxxii. p. 303 (1883) (hindwing with macular band, Surinam); Staud., *Erot. Tagf.* i. p. 12 (1884) (♀ dimorphic; Amazons); Haase, *Untersuch. Mimicry* i. p. 76 (1893) (♂ ♀); Michael, *Iris* vii. p. 213 (1894) (Sao Paulo de Olivença).
- Papilio numitor*, Boisduval, *Spec. Gén. Lép.* i. p. 317. n. 157 (1836); Bates, *Journ. Entom.* i. p. 223. n. 4 (1862) (*partim*; Guiana; "Venezuela" alia subsp.); Kirby, *Cat. Diurn. Lep.* p. 522. n. 31 (1871) (*partim*; "Guatemala" alia subsp.).
- ♀. *Papilio varus*, Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 228 (1861) (♀ of *belus*; Ega).
- ♀. *Papilio caburi* Kaye, *Entom.* xxxix. p. 51. t. 2. fig. 1 (1906) (Brit. Guiana).

♀. Hindwing, *upperside*.—There is usually only the costal patch present; many specimens have a small ill-defined patch behind the costal one, while very few specimens have a row of small spots across the disc (*numitor*).

♀. Dimorphic as in the preceding form.

a'. ♀-f. *belus* Cram., *l.c.*; *caburi* Kaye, *l.c.* (1906).—Similar to the male.—Hindwing, *upperside*, with a costal patch as in male, but usually smaller, followed either by one single spot or by a row of spots extending straight across disc, the row being not or little curved, the middle spots standing close to cell and being the smallest of all; the spots more or less yellowish; distal marginal area more or less blackish green, with brighter green halfmoons; red submarginal spot C—SC² of underside present; in ab. *amulius* the submarginal spots of the underside of the hindwing yellow according to Esper and Martyn, *l.c.*

b'. ♀-f. *amazonis* nov.—Like *varus* ♀-f. *varus*; the yellow spots beyond apex of cell smaller; the costal patch of the hindwing larger, the dark green distal border less well defined and the blue-green angle-shaped markings within it larger.

Scout-organ: scales much shorter than in *P. belus varus*, but longer than in *chalcus* and *cochabamba*.

Hab. Guiana; Amazons; Peru.

In the Tring Museum 25 ♂♂, 5 ♀♀, from: Surinam; R. Negro; Iquitos, R. Ueayali, and R. Cachyaco (Stuart); R. Chuchuras and Chanchamayo (Hoffmanns); R. Pérené (Simons); type of ♀-f. *amazonis* from Iquitos.

In coll. Godman a ♂ from Chapada, Brazil (H. H. Smith).

In coll. Oberthür a ♀ of ♀-f. *amazonis* from Massanary; three specimens of ♀-*belus* from Cayenne, two of which have a complete band of spots across hindwing, a band of smaller spots being present in the third.

In coll. F. D. Godman two specimens of ♀-f. *amazonis* from Ega and Massanary.

d. *P. belus belemus* Bates (1864).

Papilio numitor, Bates (*non* Cramer, 1777, *err. det.*), *Trans. Ent. Soc. Lond.* (2). v. p. 228 (1861) (Pará); id., *Journ. Entom.* i. p. 223. n. 4 (1862) (*partim*; Pará; local form of *belus*).

♂. *Papilio belemus* id., *Ent. Mo. Mag.* i. p. 2. note (1864) (Pará;—coll. Godman); Kirby, *Cat. Diurn. Lep.* p. 522. n. 31a (1871); Hahnel, *Iris* iii. p. 212 (1890) (Pará).

♂♀. Hindwing with straight band of spots across disc close to cell, nearly as in *cochabamba*; green submarginal half-crescents distinct.

Hab. Pará district, apparently only on the south side of the Amazon.

e. P. belus cochabamba Weeks (1901).

♂. *Papilio cochabamba* Weeks, *Canad. Ent.* xxxiii. p. 265 (1901) (Bolivia, some 200 miles north of Cochabamba); id., *Ent. News* t. 5 (1902); id., *Illustr. Diurn. Lep.* p. 39. t. 7. ♂ (1905) (reprint of orig. descript.!).

♂. Hindwing on upperside with a row of greenish white patches straight across disc, the middle patches, if large, standing near cell, there being sometimes an additional spot in apex of cell; the second to seventh spots usually of about equal size, occasionally spot 3 to 6 minute and 7 absent, or 2 to 6 large and 7 vestigial, or 2 and 4 to 6 large, 3 small and 7 absent; size of spots very variable, sometimes minute, very rarely absent, except the upper two (a male in coll. Godman from S. Mateo, Bolivia).

♀ not known to us.

Scent-organ: scales as in *P. b. chaldeus*, short, mostly as broad as long.

Hab. S.E. Peru; Bolivia.

In the Tring Museum 18 ♂♂ from: La Union, R. Huacamayo, Carabaya, 2000 ft., December 1904, and La Pampa, R. Huacamayo, 2500 ft., November 1904, wet season (G. Ockenden); Chirimayo, Carabaya, 1000 ft., July 1901, dry season (Ockenden); Montanas, R. Madre de Dios, September 1901 (Ockenden); Oroya, R. Inambari, 3500 ft., November 1901 (Ockenden); R. Shucuri, Carabaya, June 1901 (Ockenden); Salinas, R. Beni, Bolivia, July 1895 (Stuart); Province Sara, S. Cruz de la Sierra, March—April 1904 (J. Steinbach).

57. *Papilio laodamas* Feld. (1859).

Papilio laodamas Felder, *Wien. Ent. Mon.* iii. p. 393. n. 33. t. 8. fig. 1. ♂ (1859) (Bogota).

♂ ♀. Close to *P. belus varus*; red submarginal spots on underside of hindwing much thinner and nearer the margin, transverse, angulate, spot C—SC² always present, being at least vestigial; no white dots distally of these spots. The female resembling the male, but the band of the hindwing different, the first patch being much reduced, often to a mere dot, and patches R²—M¹ being at least as long as the preceding patches, sometimes patch M¹—M² even longer than R³—M¹; abdomen as in the allied species.

Scent-organ: scales about as long as in *P. belus belus*, being longer than in West Mexican *P. belus chaldeus* and shorter than in *P. belus varus*, occurring from Guatemala to North Venezuela.

Genitalia: ♂ essentially the same as in *P. belus*.

Early stages not known.

Hab. Mexico to Colombia.

Four subspecies.

a. P. laodamas procas Godm. & Salv. (1890).

Papilio procas Godman & Salvin, *Biol. Centr. Amer., Rhop.* ii. p. 203. n. 19. t. 65. fig. 15. 16. ♂ (1890) (San Blas, Jalisco; 1 ♂).

Papilio iopas iid., *Trans. Ent. Soc. Lond.* p. 248 (1897) (Colima); iid., *Biol. Centr. Amer., Rhop.* ii. p. 728. t. 111, fig. 9. 10. ♂ (1903) (Colima, 1 ♂).

♂. First patch of hindwing somewhat smaller than in the other three subspecies; the band usually close to cell, there being an additional spot in the apex of the cell; sometimes the band separate from cell (*iopas*); vestiges of white submarginal spots.—White spots on *underside* of forewing on the whole smaller than in

copanae, especially the upper ones, and the orange-red submarginal spots of the hindwing slightly larger.

♀. Greenish band of upperside of hindwing widest in centre, usually entering cell, the patches larger than in the following form, especially patches R^3 — M^2 .

Scent-organ : scales shorter than in the other subspecies.

Hab. West Mexico : Jalisco, Guerrero, Michoacan.

In the Tring Museum 6 ♂♂, 5 ♀♀, from : Colima ; Guerrero (O. T. Baron) ; Patzenaro, Michoacan.

In our two females from Patzenaro the band of the hindwing does not enter the cell ; the spots of the forewing are smaller than in the next form.

b. P. laodamas copanae Reak. (1863).

Papilio copanae Reakirt, *Proc. Ent. Soc. Philad.* ii. p. 141. n. 16 (1863) (♀, Copán, Guatemala) ; Kirby, *Cat. Diurn. Lep.* p. 521. n. 21 (1871) ; Streck., *Lep. Rhop. Het.* p. 61. t. 8. fig. 1. ♀ (1874) (fig. of type) ; Kirby, *l.c.* p. 809. n. 21 (1877) ; Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 292. n. 18. t. 66. fig. 4. ♀, 5. 6. ♂ (1890) (Yucatan ; Brit. Honduras ; Guatemala ; Honduras) ; Strecker, *l.c., Suppl.* iii. p. 17 (1900) (type, ♀, in coll. Strecker).

Papilio chrysothamas Bates, *Ent. Mo. Mag.* i. p. 1. n. 2 (1864) (Guatemala) ; Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 297. n. 122 (1864) (cit. erroneous) ; Kirby, *l.c.* p. 522. n. 30c (1871) ; Oberth., *Et. d'Ent.* iv. p. 117. n. 307^{bis} (1880) (Mexico).

♂. Band of hindwing always outside cell ; the first patch narrowed proximally, not touching the cell.—Forewing with a row of arrowhead-shaped submarginal spots, spot R^2 — R^3 produced basad ; these spots much more distinct on *underside*, there being also a spot in cell near lower apical angle. Red submarginal spots of *underside* of hindwing thin ; there are often vestiges of white submarginal spots on *upperside*.

♀. Forewing as in male, spot R^2 — R^3 occasionally vestigial.—Band of hindwing placed outside cell, there being no spot in cell or only a very few greenish white scales.

Scent-organ : scales about two or three times as long as broad.

Hab. East Mexico southward to Honduras. May be expected to occur in Nicaragua.

In the Tring Museum 5 ♂♂, 4 ♀♀, from : Sologolica, Espinal, and Jalapa, Vera Cruz, April 1896 and June 1899 (W. Schaus) ; Coahuilcos, Vera Cruz, July 1904 (A. Hall) ; San Pedro Sula, Honduras.

c. P. laodamas rhipidius subsp. nov. (Pl. IV. fig. 4).

♀. Forewing shorter and its distal edge less emarginate than in the two preceding subspecies ; vestiges of submarginal spots on *upperside* ; on *underside* four long creamy spots, the upper one reaching cell, and a spot in lower angle of cell.—Hindwing, *upperside* : a large central area of a greenish straw-colour, consisting of a patch which occupies about three-fourths of the cell, and six patches around cell, these patches acuminate distally, contiguous proximally, patch M^1 — M^2 the longest, the tips of the patches almost equally distant from outer margin ; area between cell and abdominal edge washed with greenish straw-colour ; outside this area two minute dots R^2 — M^1 of the same colour situated near the central area ; red submarginal spots of *underside* larger than in the next subspecies, the first spot distinct.

♂. A Costa Rica male in coll. H. Druce agrees with the above-described

female. The white area of the hindwing extends almost to the base in and before the cell; spots R^2 — M^2 become gradually longer, the last being the longest. Spots on underside rather smaller than in female.

Hab. Costa Rica.

In the Tring Museum 1 ♀ from Carillo, June—July 1903 (Underwood).

d. P. laodamas laodamas Feld. (1869).

Papilio laodamas Felder, *l.c.* (1859) (Bogota); *id.*, *l.c.* v. p. 72. n. 3 (1861); *id.*, *Verh. Zool. Bot. Ges. Wien* xiv. p. 297. n. 121 (1864) (Bogota); Kirby, *Cat. Diurn. Lep.* p. 522. n. 30b. (1871); Oberth., *Et. d'Ent.* iv. p. 98. n. 307 (1880) (Toquiza, Llanos de San Martin, Colombia); Maass. & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 31. n. 125 (1890) (Colombia).

♂. *Upperside*: forewing without submarginal spots.—Hindwing: a broad deep green distal border, at the edge of which there are sometimes some white dots; first patch of greenish white band large, touching cell, only a few mm. short of subbasal cellule, followed by four, seldom five, more spots, which gradually decrease in size, touching the cell, except the last one or two; usually a spot in cell, oblique, often produced to a streak situated in anterior part of cell along SC^2 and the cross-veins D^1 to D^4 .

Underside much deeper brown-black than in the Mexican races.—Forewing: three grey submarginal spots R^3 — SM^2 and some grey scales before R^3 and in lower angle of cell; these spots not prolonged.—Hindwing: red submarginal spots more regularly arched than in *procas* and *copanae*, deeper red, more heavily bordered with black, the upper ones often partly shaded over with black, the first being mostly vestigial.

Scent-organ: scales more triangular than in the preceding, being apically broader, differing much in outline from *P. belus varus* with which the present insect occurs together.

♀ not known to us.

Hab. Colombia.

In the Tring Museum 76 ♂♂ from: Cananche, Cundinamarca, July 1903 (Mathan); Muzo, September 1903 (Mathan), and December 1896; "Bogota"; R. Dagua (W. Rosenberg).

A common insect in Bogota collections.

58. *Papilio lycidas* Cram. (1777).

Papilio Eques Achirus lycidas Cramer, *Pap. Ecot.* ii. p. 25. t. 113. fig. A. ♀ (1777) (Surinam); Goeze, *Ent. Beytr.* iii. 1. p. 81. n. 43 (1779).

Papilio Eques Achirus erymanthus *id.*, *l.c.* p. 25. t. 113. fig. C. ♂ (1777) (Surinam); Goeze, *Ent. Beytr.* iii. 1. p. 79. n. 35 (1779).

Papilio Eques Trojanus belus, Fabricius (*non* Cramer, 1777, *err. det.*), *Spec. Ins.* ii. p. 9. n. 34 (1781) (*partim*); Jabl. & Herbst, *Naturs. Schmett.* ii. p. 95. n. 27 (1784) (*partim*); Fabr., *Mant. Ins.* ii. p. 5. n. 36 (1787) (*partim*); Gmel., *Syst. Nat.* i. 5. p. 2233. n. 294 (1790) (*partim*); Fabr., *Ent. Syst.* iii. 1. p. 17. n. 53 (1793) (*partim*).

Papilio erimanthus (?), Jabl. & Herbst, *Naturs. Schmett.* ii. p. 97 (1784).

Papilio lycidas, Esper, *Aust. Schmett.* p. 80 (1792); Boisd., *Spec. Gén. Léq.* i. p. 317. n. 156 (1836) (Cayenne; Surinam); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 20. n. 235 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 68. n. 304 (1852) (Pará); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Amazons; banks of rivers); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 78. n. 321 (1856) (Pará); Ménétr., *Enum. Corp. Anim. Mus. Petr., Léq.* i. p. 6. n. 93 (1857) ("Brazil"); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 228 (1861) (Pará; Ega); *id.*, *Journ. Entom.* i. p. 223. n. 5 (1862) (Upper Amazons & Pará; Guiana; habits); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 297. n. 123 (1864) (Surinam; Pará; Upp. Amazons; Bogota); Kirby, *Cat. Diurn. Lep.* p. 522. n. 27 (1871) (Guiana; Pará); Distant, *Proc. Ent. Soc. Lond.* p. xiv. (1876) (Costa

Rica); Druce, *Proc. Zool. Soc. Lond.* p. 245, n. 7 (1876) (Huallaga; Ucayali); Oberth., *Et. d'Ent.* iv. p. 99, n. 310 (1880) (Teffé); Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 125, n. 242 (1880) (Sta. Marta); Staud., *Exot. Tagf.* i. p. 12, t. 8 ♂ (1884) (Amazons; Peru; Venezuela; Chiriqui); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 201, n. 16, t. 65, fig. 17, genit. (1890) (Guatemala; Nicaragua; Costa Rica; Panama); Hahnel, *Iris* iii. pp. 149, 203, 297 (1890) S. Estéban; Valera; Iquitos); Maass. & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 31, n. 123 (1890) (Colombia); Haase, *Untersuch. Mimicry* i. p. 76 (1893); Michael, *Iris* vii. p. 213 (1894) (Sao Paulo de Olivença); Godm. & Salv., *l.c.* p. 728 (1901) (Honduras); Haensch, *Berl. Ent. Zeitschr.* xlvi. p. 154 (1903) (Archidona, 640 m.).

Ithobalus lycidas, Hübner, *Verz. bek. Schmett.* p. 88, n. 916 (1818?).

Ithobalus erymanthus, id., *l.c.* n. 917 (1818?).

Papilio belus var. *lycidas*, Godart, *Enc. Méth.* ix. p. 38, n. 42 (1819).

Papilio belus var. *erymanthus* id., *l.c.*

Papilio erymanthus, Lacordaire, *Ann. Soc. Ent. Fr.* ii. p. 384 (1833) (Guyane).

♂. Upperside of abdomen (except claspers) whitish primrose-yellow, as in the allied species; a streak of similar colour on hindwing along abdominal fold. The scales of the upperside of both wings nearly all entire, being rounded at apex, except the scaling in the cell of the forewing and along the distal edge of the hindwing. The striation of the scales is strongly marked. The scales of the yellowish white markings of the hindwing are entire, acuminate, like those of the upperside of the abdomen. There is usually only one spot on the disc of the hindwing, situated between C and SC², but many specimens bear a complete row of spots. The red submarginal spots on the underside of the hindwing are much nearer the distal margin than in *P. belus*, there being also no white admarginal dots between the veins. The forewing bears two or three creamy white submarginal spots from hinder angle forward.

♀. Abdomen green above. White streak along abdominal fold of hindwing shorter than in male, not reaching base; there is usually a complete row of spots on the disc.

Scent-organ: the scales short, some broader than long, multidentate, others about half as long again as broad, tri- or quadridentate, less often bidentate, yellowish.

Genitalia: ♂. Harpe a slightly concave, irregularly square piece of chitin, produced at the ventral and at the distal corner each in a curved tooth, a smaller tooth at the oblique upper edge, sometimes accompanied by a second small tooth.—♀. Hairy lobes situated in the vaginal cavity somewhat acuminate, rather close together; postvaginal sclerite, which forms the roof of the cavity, with a thin mesial carina.

Early stages not known.

Hab. Guatemala southwards to Bolivia, and eastwards to Pará; may be expected to occur in the province of Goyaz, Brazil.

The species does not seem to be separated into geographical races.

In the Tring Museum 56 ♂♂, 4 ♀♀, from: Moran, W. Guatemala, 4500 ft., August 1904 (A. Hall); San José, Costa Rica (Underwood); Chiriqui; Muzo, Colombia, December 1896; R. Dagua (W. F. H. Rosenberg); Coca and Archidona, Ecuador (W. Goodfellow); R. Ucayali, and R. Cachaeco (Stuart); Palcazu, Junin (Hoffmann); R. Mixiollo, Loreto (Baer); La Union, R. Huacamayo, Carabaya, 2000 ft., November and December 1904 (G. Oekenden); Province Sara, S. Cruz de la Sierra (J. Steinbach); Mérida, Venezuela (Briceño); Palma Sola, N. Venezuela; Snapure, September 1899, La Union, September 1901, and La Vuelta, May 1903, Canra R., Orinoco (S. M. Klages); Paramaribo, Surinam.

59. *Papilio crassus* Cramer. (1777).

- Papilio Eques Trojanus crassus* Cramer, *Pap. Exot.* ii. p. 23. t. 112. fig. C. ♂ (1777) (Surinam); Goeze, *Ent. Beytr.* iii. 1. p. 85. n. 58 (1779).
- Papilio Eques Trojanus belus*, Fabricius (non Cramer, 1777, err. det.), *Spec. Ins.* ii. p. 9. n. 31 (1781) (*partim*); Jabl. & Herbst, *Naturs. Schmett.* ii. p. 95. n. 27 (1784) (*partim*); Fabr., *Mant. Ins.* ii. p. 5. n. 36 (1787) (*partim*); Gmelin, *Syst. Nat.* i. 5. p. 2233. n. 294 (1790) (*partim*); Esper, *Aust. Schmett.* p. 80 sub n. 35, and p. 116. n. 50. t. 27. fig. 3. ♂ (1792); Fabr., *Ent. Syst.* iii. 1. p. 17. n. 53 (1793) (*partim*).
- Princeps dominans crassus*, Hübner, *Samml. Exot. Schmett.* i. t. 131 (1806—?).
- Ithobalus crassus*, id., *Verz. bek. Schmett.* p. 88. n. 914 (1818?); Kirby, in Hübner, *Samml. Exot. Schmett.* ed. ii. p. 92. t. 131. fig. 1. 2 (190—?).
- Papilio belus* var. *crassus*, Godart, *Enc. Méth.* ix. p. 38. n. 42 (1819).
- Papilio crassus*, Lacordaire, *Ann. Soc. Ent. Fr.* ii. p. 385 (1833) (Guyane; descr. of larva and pupa); Lucas, *Lép. Exot.* p. 33. t. 17. fig. 1. ♂ (1835); Boisdu, *Spec. Gén. Lép.* i. p. 314. n. 153 (1836) (Brazil; Guyane; larva and pupa); Lucas, in Guérin, *Dict. Pitt. Nat.* vii. p. 48 (1838); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 14 (1845) (Brazil); id., West. & Hew., *Gen. Diurn. Lep.* i. p. 19. n. 232 (1846) (Brazil; Cayenne); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 68. n. 307 (1852) (Brazil); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 79. n. 324 (1856) (Brazil; Pará); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 6. n. 91 (1857) (Brazil); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 227 (1861) (Pará; S. Paulo, Upper Amazons); id., *Journ. Entom.* i. p. 223. n. 1 (1862) (Upp. Amazons; Pará); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 298. n. 130 (1864) (Surinam; Amazons; Brazil); Kirby, *Cat. Diurn. Lep.* p. 522. n. 33 (1871); Capronn., *Ann. Soc. Ent. Belg.* xvii. p. 9. n. 9 (1874) (Rio. Sept.; Botafogo, Nov.); Druce, *Proc. Zool. Soc. Lond.* p. 245. n. 9. (1876) (Peru); Butl., *Ann. Mag. N. H.* (4). xx. p. 127. n. 59 (1877) (R. Mairo, Peru); Burm., *Descr. Rép. Argent. v. Lép., Atlas* p. 6. n. 11 (1879) (larva, pupa; Rio de Janeiro); Oberth., *Et. d'Ent.* iv. p. 99. n. 311 (1880) (Ecuador; Brazil); Staud., *Exot. Tagf.* i. p. 12. t. 8. ♂ (1884) (S. Brazil; S. Peru to Venezuela); Maass. and Weym., in Stübel, *Reisen S. Amer.*, *Lep.* p. 91. n. 37 (1890) (S. Catharina!); Haase, *Untersuch. Mimicry* i. p. 76 (1893); Michael, *Iris* vii. p. 213 (1894) (Sao Paulo de Olivença); Bönningb., *Verh. Ver. Nat. Unterb. Hamburg* ix. p. 28 (1895) (Rio de Janeiro; rather common); Peters, *Illustr. Zeitschr. Ent.* ii. p. 52 (1897) (Nova Friburgo, larva, pupa); Haensch, *Berl. Ent. Zeitschr.* xlviii. p. 154 (1903) (Arehidona, 640 m.); Weeks, *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumani, Bolivia).
- Papilio lepidus* Felder, *Wien. Ent. Mon.* v. p. 72. n. 1. (1861) (Caracas; coll. Kaden, var. in coll. Godman); Bates, *Journ. Ent.* i. p. 223. sub n. 1 (1862) (Venezuela, local form of *crassus*); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 298. n. 129 (1864) (Venezuela; Bogotá); id., *Reise Novara, Lep.* p. 40. n. 29. t. 10. fig. a. ♂ (1865) (Venezuela; Bogotá); Staud., *Exot. Tagf.* i. p. 12 (1884) (Colombia; Venezuela); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 203. n. 20 (1890) (Panama); Weeks, *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumani, Bolivia).
- Papilio crassus* var. a. *P. lepidus*, Kirby, *Cat. Diurn. Lep.* p. 522. sub n. 33 (1871) (Venezuela).

♂. White scales on upperside of abdomen acuminate: the proximal segments more or less extended green-black. Sealing of upperside of forewing denticulate; two large patches R³—M², a long streak in cell and a streak behind M² occupying the hinder angle behind M² and cell, yellowish cream-colour; these patches often reduced or entirely absent; the same patches on the underside, but paler, here often preserved in specimens in which they are absent from the upperside.—Sealing of upperside of hindwing non-dentate; a large greenish white patch between C and SC² reaching from subbasal cell to near apex of C, limited in front by this vein, many specimens with a short streak behind SC² near distal margin; submarginal spots of underside brick-red, occasionally slightly rufous, usually accompanied by more or less distinct but minute white admarginal dots which stand at the veins (as in the allied species), not in the centre between the veins, being remnants of transverse bars; there is rarely a red spot between C and SC².

♀. Wings similar to those of male, but the white subcostal patch of the hindwing reduced, being represented by an ill-defined submarginal spot.

Scent-organ similar to that of *P. lycidas*, the scales being short and broad, denticulate.

Genitalia: ♂. Harpe small, short, triangular, rather broader than long, apex rounded, ventral edge dilated into a flat triangular process as in *P. belus*, *laodamas*, etc., this process standing almost vertically on the plane of the harpe, leaning dorsad, being curved basad, denticulate at distal edge, the dentition extending to apex of harpe.—♀. The two hairy flaps situated proximally in the vaginal cavity rounded, widely separated from each other.

Early stages described by Lacordaire, *l.c.* (1833), and again shortly noticed by Burmeister, *l.c.* (1879), and Peters, *l.c.* (1897).

There are no geographical forms, but the male is dichromatic in the forewing, only one form of the female being known.

a. ♂-f. *crassus* Cram., *l.c.*—Forewing with yellowish creamy patches.

b. ♂-f. *lepidus* Feld., *l.c.* No creamy patch on upperside of forewing.—This male form alone occurs in Venezuela, Colombia, Panama, and Costa Rica, the females from these countries not being devoid of the patch. Males with hardly any creamy scaling on the upperside of the forewing occur also in other districts, for instance Bolivia.

Hab. of *P. crassus*: from Costa Rica southwards to Rio de Janeiro.

In the Tring Museum 60 ♂♂, 10 ♀♀, from: Carillo, Costa Rica, 3000 ft., October 1904 (A. Hall); Chiriqui; Muza, Colombia, December 1896; Pereira, Popayan and Cali, Cauca; Zamora, Ecuador (O. T. Baron); Loja; Palcazu, Junin (Hoffmanns); Chanchamayo; Pozuzo; R. Cachyaco, affluent of R. Huallaga (Stuart); La Union, R. Huacamayo, Carabaya, 2000 ft., November and December 1904, wet season (Oekenden); R. Songo to R. Snapi, Bolivia, 1100 m., March—April 1896 (Garlepp); Mapiri, 1000 ft., September 1895 (Stuart); Villa Maria to Diamantino, Matto Grosso, January 1897 (Audeer); Tijuca; Petropolis; Amazons: Iquitos and Itaituba; Surinam; British Guiana; Canra R., Orinoco, May 1900 (S. M. Klages); Valencia, Venezuela.

SECTION II.—FLUTED SWALLOWTAILS.

(For differential characters see p. 433.)

This section contains the largest number of species. It is the most widely distributed Section, occurring in all regions, except the Antarctic, going in one species (*P. machaon*) as far north as Alaska and Kamtchatka. The variety in structure and pattern among the species is very great. Owing to the preservation of many intermediate species, the division of this Section into minor groups is not quite so well marked as in Sections I. and III.

The American species fall into two Subsections, which, taken each as a whole, are characterised, the one by the prevalence of yellow colour and the softness of the costal edge of the forewing, the other by the prevalence of black on the body and wings and the hardness of the costal margin of the forewing, the insects of this second Subsection being more strong-winged than those of the first Subsection. However, in the second Subsection there is a mimetic group of soft-winged species (*Zagreus Group*), which appears to have acquired secondarily the soft costal edge and the great amount of yellow on the wings and body. This mimetic group exhibits a most curious feature in the coloration of the head. While in all Papilios

which have the frons striped with yellow, a yellow stripe is situated on each side along the eye, *P. zagreus* and allies have a yellow line in the middle of the frons. The obtuse apex of the forewing and convex distal margin, the position of SC³ of the forewing proximally of the upper angle of the cell, the great width of the cell and the long slender antennae are further peculiarities which separate *P. zagreus* and allies from the other American Papilios. The hard dentate costal edge of the species of the second Subsection (apart from *P. zagreus* and allies) has doubtless been evolved in connection with a strong flight. We find the same feature in a group of *Nymphalidae*, namely, the prionopterous genera *Charaxes*, *Eulepis*, and allies, which are all strong fliers, and also in the males of some *Pieridae*. The great robustness of the thorax (as compared with the size of the wings) observed in those Nymphalids is again met with in the Papilios with serrated costal edge to the forewing.

The following generic names have American species for name-types, nomina nuda not being here mentioned :

Euphacades Hübner, *Verz. bek. Schmett.* p. 83 (1818 ?) (type : *glaucus*).

Heraclides id., *l.c.* (type : *eresphontes*).

Calaides id., *l.c.* p. 86 (1818 ?) (type : *androgeus*).

Priamides id., *l.c.* p. 87 (1818 ?) (type : *torquatus*).

Pyrrhosticta Butler, *Cist. Ent.* i. p. 86 (1872) (type : *eleotas*).

Troilides Kirby (ex Hübner, indescr.), in Allen's *Nat. Libr.*, *Butt.* ii. p. 283 (1896) (type : *torquatus*).

SUBSECTION C.*

Palpi yellow at side. Frons yellow, or with black mesial stripe, rarely all black. Abdomen at least with yellow dots at sides, usually with yellow stripe or for the greater part yellow. Scaling at the costal edge of forewing very dense and tough, difficult to rub off, the edge non-dentate.

We divide the American species into six groups :

- a. Hindwing on underside with a subbasal and a submedian band, which unite near anal angle, forming a large black V *Glaucus Group.*
- No such bands b.
- b. Pronotum and underside of thorax with red or orange dots; no metallic blue spots on underside of hindwing *Anchisiades Group.*
- No such spots c.
- c. No metallic blue spots on underside of hindwing; abdomen yellow beneath, with black line along upper edges of sternites; if this line absent, then tail with yellow marginal spot at apex; or abdomen black, with yellow line along lower edges of tergites, hindwing without regular row of yellow submarginal spots *Torquatus Group.*
- With metallic blue spots on hindwing d.
- d. Abdomen striped with black and yellow beneath, or black dotted with yellow, there being two rows of yellow dots on each side of the tergites; cross-veins of forewing with yellow bar at least on underside . . . *Machaon Group.*

* For Subsection D see after Species No. 104.

- Abdomen striped with black and yellow, antenna pale tawny; or abdomen black, dotted with yellow, only one row of dots on each side of the tergites, antenna black *Troilus Group.*
- Abdomen entirely yellow beneath and at sides; or all black, except a row of yellow dots situated laterally on the sternites, there being no dots on the tergites; or the abdomen black (♀♀), with a yellow line at the lower edges of the tergites, the hindwing of these females bearing a regular row of yellow submarginal spots at least on underside *Thoas Group.*

V. Machaon Group.

Antenna reaching to two-thirds of cell of forewing; club thick, obtuse, the last segment very short, the preceding three or four more than twice as broad as long. Abdomen either with yellow longitudinal bands, or black, with rows of yellow spots, two rows on each side of the tergites. Tail non-spatulate. Basal half of hindwing yellow or black, without the large V formed by black bands in the *Glaucus Group*. Cell of hindwing not widened. Harpe of male saw-like, the distal portion being a denticulate ridge and the proximal portion being less elevate, non-dentate, subcylindrical. In female on each side of vaginal orifice a long three-cornered flap which is dentate at the edges; proximally of these flaps a continuous, slightly elevate, ridge from side to side; behind the orifice a membranaceous tubercle clothed with extremely small hairs.

The anal eye-spot, composed of the marginal and submarginal spots, is better developed in this group than in the *Glaucus Group*. The origin of the ocellus from the two spots mentioned is well illustrated by *P. daunus* and allies; also in the present group the component submarginal and marginal spots remain occasionally separate.

With the exception of the Asiatic *P. xuthus*, which stands apart, the species of the *Machaon Group* are all very closely allied to one another. *P. indra* is the only one which is recognisable by the genital armature, all the others being identical in structure, as far as we know. The larvae also not presenting any very trenchant characters, one might well ask if *P. machaon*, the dimorphic *P. bairdi*, the variable *P. polyxenes*, the comparatively constant *P. zelicaon* and *P. nitra* are really specifically distinct from one another. Judging from the structure and pattern alone, one might be inclined to regard all these insects as individual and geographical forms of one species. However, one important fact is known which speaks entirely against this assumption. *Papilio bairdi* and *P. polyxenes asterius* occur in the same cañons in Colorado, but keep perfectly separate, the one living as caterpillar on *Umbelliferæ*, the other on a Composite plant (*Artemisia dracunculoides*). If these two insects exist independently side by side—i.e. are true species—there is no reason to treat *P. zelicaon* otherwise than as a species by itself. And *P. machaon aliaska*, which occurs as far south as Oregon according to the two Edwardses, must also be considered independent of *P. bairdi* f. *oregonia* in spite of the close general resemblance in pattern. We doubt if *P. nitra* is more than a northern form of *P. bairdi*.

Papilio xuthus and the Pacific Palaearctic *P. machaon hippocrates* are seasonally dimorphic. In the American species dimorphism appears to be purely individual, the two varieties being produced by one female independent of the season, as is the case in some African *Prezis*. However, besides the dimorphic *P. bairdi* from Colorado, no other dimorphic form has been actually reared. Breeding from the eggs of one female of *P. nitra*, of an Oregon female of *P. bairdi* f. *oregonia*, of a Mexican female of *P. polyxenes asterius*, and of a female of *P. polyxenes americus*, is a great desideratum.

Key to the American species :

- a. Yellow patch M²—SM² of forewing close to cell b.
- Yellow patch M²—SM² of forewing widely separated from cell, sometimes absent d.
- b. Abdominal sternites yellow, with two black lines c.
- Abdominal sternites black, with or without indication of yellow lines Species No. 63.
- c. Anal ocellus with pupil Species No. 61. c'.
- Anal ocellus without pupil Species No. 65. a.
- d. Palpus and breast entirely black Species No. 64.
- Palpus yellow e.
- e. Abdomen dotted with yellow f.
- Abdomen with broad yellow lateral stripe Species No. 61. b'.
- f. Discal spots of hindwing below reddish orange, more or less edged with yellowish cream; or the yellow band gradually shading off proximally, often extending to base; or the discal spots of upperside small, shaded over with black, the band being distal of cell on hindwing Species No. 60.
- Orange colour of discal band of underside of hindwing more gradually shading off, the band always crossing apex of cell, never extended to base Species No. 61. a' and No. 62.

60. *Papilio polyxenes* Fabr. (1775).

Papilio Eques Achirus ajax Linné, *Syst. Nat.* ed. x. p. 462. n. 26 (1758) (*partim*); Clerck, *Icon. Ins.* ii. t. 33. fig. 3. ♂ (1764).

Papilio Eques Trojanius polyxenes Fabricius, *Syst. Ent.* p. 444. n. 10 (1775).

Linné's description of *ajax* applies, we think, to the present insect. The two references given after the description count for nothing, applying to totally different insects, the second being quoted later by Linné himself under *P. protesilaus*. In the twelfth edition of *Syst. Nat.* Linné described *P. xuthus* as being very similar to *P. ajax*. Esper (1798) tried to explain this comparison by assuming that Linné meant Clerck's *ajax*, not his own. The three facts: (1) that Linné characterised the anal ocellus of *ajax* and *machaon* by the same words (*angulo ani fulvo*), (2) that Clerck's work was executed under Linné's eyes—one might almost say under his supervision, and (3) that in 1767 Linné describes *P. xuthus* as being very similar to *ajax*, leave little doubt that the true *ajax* of Linné was the insect which Cramer named *asterius* (corrupted by Fabricius into *asterias*), which is the same species as *polyxenes* Fabr., but a different geographical race. However, since Linné himself misled later authors by the erroneous quotation of Raj. iii. 2 and Edw.

av. 34, under *ajax*, we think the wisest course to follow is to suppress the name *ajax* altogether.*

The subspecies of *P. polyxenes*, which name comes next in priority after *ajax*, do not all completely grade into one another. The differences are, however, so slight that the close connection between the various forms becomes at once evident on comparing a long series.

a. P. polyxenes americanus Kollar (1850).

- Papilio americanus* Kollar, *Denkschr. K. Ak. Wiss. Wien, Math. Nat. Cl.* i. p. 354. n. 10 (1850) ("N. Granada, ad ripas fluminis Orinoco"); Doubl., Westw. & Hew., *l.c.* (1852); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 66. n. 294 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* 76. n. 311 (1856); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 315. n. 359 (1864) (= *sadulus*; Bogota; Venezuela; Ecuador; "Mexico?" false); Kirby, *Cat. Diurn. Lep.* p. 566. n. 322 (1871); Edw., *Trans. Amer. Ent. Soc.* vi. p. 10. n. 13 (1877) ("S. Calif., Arizona" false; = *sadulus*); Standl., *Erot. Tagf.* p. 18. t. 12. 3 (1884) (*partim*; Colombia; Ecuador; Venezuela); Olliff, *Prov. Ent. Soc. Lond.* p. 22 (1881) (monstr. in neuration); Maass & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 14. n. 12 (1890) (Bogotá, 2600—3000 m); iid., *l.c.* p. 34. n. 30 (1890) (Oparapo, Colombia, 1200 m.); iid., *l.c.* p. 41. n. 5 (1890) (Ales, near Pasto, 2100 m.); iid., *l.c.* p. 48. n. 11 (1890) (near Ibarra, 2370 m.); iid., *l.c.* p. 56. n. 80 (1890) (Baños, 1800 m.); iid., *l.c.* p. 58. n. 13 (1890) (Pululagua, 2500 m.); Hähnel, *Iris* iii. p. 185 (1890) (Mérida); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 243. n. 82 (1890) (*partim*; Colombia; Venezuela; Ecuador; "Angostura" false); Mayn., *Man. N. Amer. Butt.* p. 6. n. 6 (1891) (Arizona); Edw., *Batt. N. Amer.* iii. *Pap.* iii. fig. 1. 2. ♂, 3. ♀ (1891) ("Arizona" error loci; Bogota; "Southern Mexico to Ecuador" *partim*); Godm. & Salv., in Whymper, *Audes of Equator, App.* p. 109. n. 95 (1891) (Machachi, 10,000 ft.); Haase, *Untersuch. Mimicry* i. p. 92 (1893); Eimer, *Artbild. Verwaultsch. Schmett.* ii. p. 125 (1895) (*partim*; —t. 7. fig. 3. represents a Chiriqui specimen).
- Papilio sadulus* Becker, *Bull. Soc. Ent. France* p. 33 (1851) (*nom. nudum!* Quito).
- Papilio sadulus* Lucas, in Guér., *Rev. Zool.* (2). iv. p. 133. t. 10. fig. 4 (1852) (Quito); Doubl., Westw. & Hew., *l.c.* ii. p. 529 (1852); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 39. n. 185 (1852) (Quito); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 51. n. 191 (1856) (Quito; Colombia; Venezuela); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 4. n. 59 (1857) (Quito); Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 126. n. 236 (1880) (Sta. Marta); Oberth., *Et. d'Ent.* iv. p. 68. n. 195 (1880) (*partim*; Ecuador).
- Papilio asterius* var. *a*, Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 38. sub n. 184 (1852) (Venezuela).
- Papilio asterioides*, Strecker (*non* Reakirt, 1866, *err. det.*), *Lep. Rhop. Met.* p. 47. t. 6. fig. 4. ♀ (1873) ("Costa Rica" false).
- Papilio asterius*, Dewitz, in Wieg., *Arch. Naturg.* xxxiv. 1. p. 4. t. 1. fig. 2. 3. 4 (1878) (larva, pupa; Venezuela).
- Papilio polyxenes*, Staudinger (*non* Fabr., 1775, *err. det.*), *Erot. Tagf.* p. 18 (1884) (*partim*; Venezuela; Colombia).
- Papilio sadulus* (?), Haensch, *Berl. Ent. Zeitschr.* xviii. p. 152 (1903) (Baños, R. Pastaza, 1800 m.).
- Papilio polyxenes* var. *asterioides*, Maassen & Weym. (*non* Reakirt, 1866, *err. det.*), in Stübel, *Reisen S. Amer., Lep.* p. 38. n. 34 (1890) (Popayan).

♂♀. Specimens which resemble the following subspecies in the width of the yellow discal band can be distinguished by the last spot of this band on the forewing being produced basad and by the black basal area of the hindwing below being much less sharply defined, gradually shading off.

The subspecies is remarkably dichromatic, in one extreme the yellow colour of the hindwing extending to the very base, while in the other extreme the yellow discal band is much reduced. There are all intergradations. The black specimens were erroneously called *polyxenes* Fabr. by Staudinger, and *asterioides* Reak. by Maassen & Weymer and by Strecker.

a'. f. americanus Kollar, *l.c.*—The discal band of the forewing, above, is often washed with orange, as is also the case in some specimens of *P. polyxenes stabilis*,

* See p. 414; also *P. marcellus*.

while one of our females (Mérida) is almost as pale as *P. indra*; the last spot of the band is nearly always much longer than the patch M^2 — SM^2 . The base of the hindwing is in most individuals black as far as SC^2 or a little beyond, but in many specimens the black basal area is much restricted, having practically disappeared in a few individuals. On the *underside* the basal area of the hindwing is more or less washed out distally, the black scaling being in a large percentage of the specimens restricted to the extreme base or being altogether absent; sometimes the forewing is also much shaded with cream-colour. The abdomen bears often a broad yellow lateral stripe, with which the dorso-lateral dots are more or less merged together. The postmedian cell-bar of the forewing is often more or less distinct on the underside.

The figures in Edwards, *Butt. N. Amer., l.c.*, represent average specimens of this form; figs. 1 and 2 agree perfectly with typical Bogota specimens. We do not believe the original of these figures came from Arizona. If the specimen had been a straggler from the south, one would expect it to belong to the Central American form, which it does not. Some mistake in labelling is, we think, the true explanation of the record of *americus* from Arizona.

v. f. melasina nov.—Yellow discal band of forewing reduced on both wings to a row of spots which are shading off proximally; bar on cross-veins of forewing present. The band rather broader on *underside*, but never entering cell of hindwing, more sharply defined on both wings than above, but occasionally gradually shading off proximally; the basal half of the hindwing rarely washed with buff.

These black individuals resemble the dark Mexican form *asterioides* of *P. polyxenes asterius*; however, the forewing is proportionally broader, the discal spots are powdered over with black proximally, the discocellular bar is present, the tail is shorter, etc.

This form appears to occur more frequently in the Cauca valley (probably at high altitudes) than anywhere else. Type of name from Pereira, Cauca valley. Strecker, *l.c.*, figured as *P. asterioides* Reak. a female of this form, said to be from Costa Rica. It is not impossible that a melanotic form occurs in that country, but we cannot accept Strecker's statement without further evidence. Mistakes as to locality occur easily, and we know for certain that at least in one case among *Papilio* Strecker gave a wrong locality, his *P. cleombrotus* being erroneously stated to have come from the Amazons.

Hab. of *P. polyxenes americus*: North Peru to Colombia and Venezuela.

The type of *americus* came doubtless from the Cordillera of Bogota, which Sulkowsky traversed on his way from the R. Magdalena to the Orinoco, going by the R. Meta.

In the Tring Museum 110 ♂♂, 37 ♀♀, and 4 pupae, from: Cayambe, N.W. Ecuador, June—July 1897, 9000 ft. (W. Rosenberg); Baños (R. Hacnsch); Pereira, Cauca; "Bogota"; Villavicencio to Monte Redondo, March 1897 (Dr. Bürger); Valdivia, Colombia, July 1897 (Pratt); Bogota to Coachi, 2800 down to 1700 m., January 1897 (Dr. Bürger); Mérida, Venezuela, 2000—3000 m., October to January (Bricceno).

b. P. polyxenes stabilis subsp. nov.

Papilio sadalus, Butler & Druce (non Lucas, 1852, err. det.), *Proc. Zool. Soc. Lond.* p. 365. n. 383 (1874) (Costa Rica); Oberth., *Et. d'Ent.* iv. p. 68. n. 195 (1880) (*partim*; Chiriqui).

Papilio americanus, Edwards, *Papilio* iii. p. 55 (1883) (Panama; Chiriqui); Stand., *Exot. Tagf.* p. 18 (1884) (*partim*; Honduras to Chiriqui); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 243. n. 82. t. 72. fig. 8. genit. (1890) (*partim*; Costa Rica; Chiriqui; not farther north); Eimer, *Artbild. Verwandtsch. Schmett.* ii. p. 125. t. 7. fig. 3. ♀ (1895) (*partim*).

♂♀. The Central American specimens do not vary so much *inter se* as do the South American ones, the present subspecies being monochromatic. The yellow band across the disc of both wings is always broad, not varying very much in width; the last spot of this band on the forewing is about as long as the patch before it, not projecting basad. There is sometimes a postmedian cell-bar present above and below, being larger on underside.—On the hindwing the inner edge of the band crosses the cell at point of origin of SC^2 or proximally of it.

On the *underside* the band is proximally much more sharply defined than in the South American form, the hindwing being purer black from base to band.

Hab. Costa Rica; Chiriqui; Sevilla I., Pacific side of Panama; Honduras (*teste* Staudinger, *l.c.*); name-type from Costa Rica.

The only specimen (a ♀) from Sevilla Island which we have is of interest, the anal ocellus lacking the black dot above and below.

Eimer's figure, *l.c.*, is undoubtedly taken from a female of the present subspecies (probably from a Chiriqui specimen received from Messrs. Staudinger & Bang-Haas), though the habitat is given beneath the figure as being Colombia, Venezuela, and Ecuador, which countries are inhabited by the preceding subspecies.

The dot in the yellow spot SC^4 — SC^5 is absent from one of our Chiriqui females.

In the Tring Museum 46 ♂♂, 14 ♀♀, from: Sevilla I., January 1902 (Batty); Chiriqui; Boquete, Chiriqui, 3500 ft. (Watson); San Juan, Costa Rica, 4000 ft., September 1904 (A. Hall); Carillo, Costa Rica, 3000 ft., October 1904 (A. Hall); S. José, 4000 ft., October 1904 (A. Hall); Escazu, Costa Rica, October 1903 (Underwood); Puriscal, October 1903 (Underwood); Cartago (Underwood); Gnatil Piris, December 1901 (Underwood); Alahuela, 4000 ft., September 1904 (A. Hall).

c. Papilio polyxenes asterius Cram. (1782).

Petiver, *Gazoph.* t. 6. fig. 12 (1709).

Papilio Eques Achivus ajax Linné, *Syst. Nat.* ed. x. p. 462. n. 26 (1758) (*partim*); Clerck, *Icon. Ins.* ii. t. 33. fig. 3. ♂ (1764).

Papilio Eques Trojanus troilus, Drury (*non* Linné, 1758, *err. det.*), *Illustr. Exot. Ins.* i. p. 22. t. 11. fig. 2. ♂, 3. ♀, and Index (1770-71) (N. York; Maryland; Virginia); Fabr., *Syst. Ent.* p. 444. n. 7 (1775) (*partim*); Cramer, *Pap. Exot.* iii. p. 25. t. 207. fig. A. ♀ (1779) (N. York; "Jamaica" false; ocellus blind); Goetze, *Ent. Beytr.* iii. 1. p. 31. n. 6 (1779) (*partim*); Jabl. & Herbst, *Naturs. Schmett.* ii. p. 242. n. 58. t. 17. fig. 3. 4 (1784) (*partim*).

Papilio Eques Achivus asterius Cramer, *Pap. Exot.* iv. p. 194. t. 385. fig. C. D. ♂ (1782) (N. York; Carolina; Virginia); Esper, *Ausl. Schmett.* p. 47. n. 18. t. 11. fig. 1. 2 (1786) (N. York).

Papilio Eques Trojanus polyxenes, Jabl. & Herbst, *Naturs. Schmett.* ii. p. 253. t. 18. fig. 1. ♂ (1784) (= *asterius* = *ajax* Clerck; *partim*).

Papilio Eques Trojanus asterius (!), Fabricius, *Mant. Ins.* ii. p. 2. n. 13 (1787) (*partim*); Gmelin, *Syst. Nat.* i. 5. p. 2228. n. 280 (1790) (*partim*); Fabr., *Ent. Syst.* iii. 1. p. 6. n. 16 (1793).

Papilio troilus, Abbot & Smith, *Ins. Georgia* ii. p. 1. t. 1. ♂. ♀. l. p. (1797); Butler, *Cat. Diurn. Lep. descr. Fabric.* p. 249. n. 52 (1869) ("S. Domingo" perhaps erroneous, the ♀ in Brit. Mus. being like ordinary North American ♀♀).

Papilio asterius, Esper, *l.c.* p. 248. t. 40b. fig. 6. ♀ (1798); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 37. n. 184 (1852); *id.*, *List Lep. Ins. Brit. Mus.* i. p. 51. n. 193 (1856) (*partim*); Gosse, *Letters from Alabama* p. 78 (1859); Reak., *Proc. Ent. Soc. Philad.* vi. p. 123 (1867) (Colorado); Strecker, *Butt. Moths N. Amer.* p. 71. n. 17 (1878); Haase, *Untersuch. Mimicry* i. p. 92 (1893); Grant, *Canad. Ent.* xxviii. p. 273 (1896) (Orillia, Ont., formerly common, now rare); Eimer, *Orthogen.* p. 37. fig. 17 (1897); Bubna, *Ent. News* viii. p. 98 (1897) (Cleveland, Ohio; common

as usual); Duzee, *Bull. Buffalo Soc. N. Sci.* v. p. 107, n. 3 (1897) (Buffalo); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 271 (1897); Thoms, *Canad. Ent.* xxix. p. 263 (1897) (larva on *Ruta graveolens*!); Beutenm., *Bull. Amer. Mus. N. H.* x. p. 310 (1898) (Highland Falls, N.Y.); Fyles, *Rept. Ent. Soc. Ontario* xxix. p. 44 (1899) (on parsnip, carrot, etc.); Holland, *Bull. Book* p. 314, t. 2. fig. 17. 24. 27. larva, t. 6. fig. 13. 18. 19. pupa, t. 40. fig. 1. ♂ (1899); Webst., *Ent. News* xi. p. 577 (1900) (larva on *Cosmos*); Dent., *Moths Butt. U.S.* p. 346. fig. ♂. ♀ (1898—1900); Beutenm., *Butt. N. York City* p. 4. fig. ♂ (1902); Wasm., *Ent. News* xiii. p. 23 (1902) (a larva feeding in January); Ellsw., *ibid.* p. 104 (1902) (aberr., similar to *indra*, Lestershire, N.Y., June 17, 1899); Comst., *ibid.* xiv. p. 197 (1903) (Adirondack Mts., rare in Aug.); Laur., *ibid.* p. 296 (1903) (Miami, Fla., common).

Euphocaedes asterius, Hübner, *Verz. bek. Schmett.* p. 83. n. 849 (1818?).

Papilio asterias, Godart, *Enc. Méth.* ix. p. 58. n. 91 (1819); Boisdu & Lec., *Hist. Gén. Léop. Amér.* Sept. p. 14. t. 4. ♂. ♀. l. p. (1833) (*partim*; Virginia; Georgia); Lucas, *Pap. Erot.* p. 38. t. 20. fig. 1 (1835); Boisdu, *Spec. Gén. Léop.* i. p. 332. n. 175 (1836) (*partim*; U.S.A.; Mexico); Drury, ed. Westw., *Illustr. Erot. Ins.* i. p. 21. t. 11. fig. 2. 3. 5 (1837); Harris, *Ins. Inj. Veget.* p. 212 (1841); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 15 (1845); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 161 (1846); Karsten, *Arch. Anat. Phys. & Med.* p. 375. t. 11 and 12 (1848) (thoracical gland of larva); Kirtl., *Proc. Ent. Soc. Lond.* (2). i. p. 101 (1851) (larva on *Umbelliferae*, incl. of *Cicuta virosa*!); Harris, *l.c.* ed. ii. p. 231 (1852); Urian, *Canad. Nat. Geol.* ii. p. 220. fig. a. b. t. 3. fig. 2. 3 (1857); Ménétr., *Enum. Corp. Anim. Mus. Petrop., Léop.* p. 4. n. 60 (1857) (Mexico); Vollenh., *Tijdschr. Ent.* iii. p. 85. n. 125 (1860); Morris, *Syn. Lep. N. Amer.* p. 5. n. 7 (1862); Harr., ed. Flint, *Ins. Inj. Veg.* p. 265. t. 4. f. 4. ♂, 5. ♀, 6. 1, 7. p. (1862) (life history); Reak., *Proc. Ent. Soc. Philad.* ii. p. 137. n. 4 (1863) (Chiapas; syn. excl.); Weidem, *ibid.* p. 146 (1863) (*partim*); Lintn., *ibid.* iii. p. 51 (1864) (Eastern N. York, eggs, larva, pupa); Kirkp., *ibid.* p. 329 (1864) (Cleveland, Ohio, common); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 315. n. 361 (1864) (*partim*; Canada to Nicaragua); Edw., *Proc. Ent. Soc. Philad.* iv. p. 390 (1865) (hermaphrodite); Tenney, *Man. Zool.* fig. 281. 282 (1867); Reed, *Canad. Ent. i.* p. 19 (1868) (London, Ont.); Riley, *Amer. Entom.* i. p. 58 (1868); Harris, *Ent. Corr.* p. 270 (1869); Bethune, *Canad. Ent.* ii. p. 8 (1870) (Toronto, July); Parker, *Amer. Entom.* ii. p. 175 (1870) (Iowa); Riley, *Canad. Ent.* iv. p. 37 (1872) (Peterboro Co., Ont., May); Scudd., *ibid.* iv. pp. 74, 84 (1872) (Abbot's MS.); Edw., *ibid.* v. p. 8 (1873) (name to be retained!); id., *Proc. Cal. Ac. Sc.* v. p. 163 (1873) (larva descr. after Boisdu; Marin Co., Oakland); Treat, *Amer. Natural.* p. 129 (1873) (controlling sex, experiment); Bean, *Ent. Mo. Mag.* x. p. 248 (1874) (Galena, Ill., common, June and again midsummer); Mead, in Wheeler, *Rept. Expl. Surv. v. Zool.* 8. p. 740 (1875) (Colorado; N. Mexico; "California" error); Moore, *Canad. Ent.* vii. p. 60 (1875) (Fulton Co., Ohio, July, larva); French, *Trans. Dept. Agric. Illin.* xv. p. 137 (1877); Saund., *Rept. Ent. Soc. Ontario* p. 37. fig. 8 (1877); Pagenst., *Verh. Nat. Med. Ver. Heidelb.* (2). i. p. 87 (1874); Edw., *Trans. Amer. Ent. Soc.* vi. p. 10. n. 12 (1877) (Atlantic to Pacific; Canada to Gulf of Mexico; Arizona); Worth., *Canad. Ent.* x. p. 17 (1878) (♀, with "fungus"—pollen!); Drury, *Cincinnati Soc. Nat. Hist.* i. p. 12 (1878) (Cinc., common); Edw., *Canad. Ent.* xi. p. 86 (1879) ("Costa Rica" false; black ♂); Ballard, *Ins. Lives* p. 321. fig. (1879); Oberth., *Et. d'Ent.* iv. p. 69. n. 197 (1880) (Florida; Mexico); M dcl., *Trans. Dept. Agric. Illin.* xviii. App. p. 74 (1880); Coq., *ibid.* p. 173 (1880); Olliff, *Proc. Ent. Soc. Lond.* p. 28 (1881) (abnormal neuration); Newm., *Proc. Ent. Soc. Philad.* i. p. 26 (1881) (N. Jersey; on carrot); Edw., *Papilio* iii. pp. 54, 60. t. 1. fig. 1. 2. 3. ocellus (1883) ("Panama" false); Fern., *Butt. Maine* p. 23 (1884); Edw., *Canad. Ent.* xvi. p. 115 (1884) (babits of larva); Gruber, *Jenn. Zeitschr. Nat.* xvii. p. 467. t. 7. fig. 1-5 (1884) (metam.); id., *Papilio* iv. p. 84. t. 1. fig. 1-5 (1884) (transf.); Lintn., *ibid.* p. 136. n. 2 (1884) (Rio Grande); Aaron, *ibid.* p. 172 (1884) (S. Texas); Hagen, *Ent. Mo. Mag.* xx. p. 169 (1884) (hunted by *Aonar longipes*); Tepper, *Ent. Amer.* i. pp. 159, 186 (1885) (variability of ocellus); Christy, *Ent. Mo. Mag.* v. p. 278 (1885) (attr. by faded leaves); Mayn., *Butt. N. Eng.* p. 51. t. 6. fig. 71. 71A (1886); French, *Butt. East. U.S.* p. 89. fig. 14. 15. 16 (1886); Riley, *Insect Life* i. p. 161 (1888) (parasites, *Trogus obsidivator* and *exesorius*); Weed, *Psyche* v. p. 52 (1888) (larvae in July, Champaign, Ohio); Hagen, *ibid.* p. 305 (1888) (caught by *Aonar*); Skiun., & Aar., *Canad. Ent.* xxi. p. 126 (1889) (Philadelphia, common); Edw., *Bull. U.S. Nat. Mus.* xxxv. p. 10 (1889) (liter. rel. to metam.); Mayn., *Man. N. Amer. Butt.* p. 8. n. 12. fig. 6. b (1891); Kent, *Insect Life* iii. p. 338 (1891) (Roxie, Miss.); Edw., *Canad. Ent.* xxiv. p. 49 (1892) (Colorado, black ♂); Foster, *ibid.* p. 192 (1892) (Marshall Pass, Colorado, 10,000—13,000 ft.); Staley, *ibid.* p. 204 (1892) (Marshall, Missouri, common); Weed, *ibid.* p. 277 (1892) (I-saquena Co., Mississippi); Davis, *Journ. N. York Ent. Soc.* i. p. 47 (1893) (Staten I., N.Y., May to Oct.); Skiun., *Ent. News* iv. p. 82 (1893) (N. Carolina); Jones, *ibid.* p. 190 (1893) (Richmond Co., N.C.); Cockerell, *Trans.*

- Amer. Ent. Soc.* xx. p. 353. n. 646 (1893) (Colorado); Benteinm., *Bull. Amer. Mus. N. H.* v. p. 242. t. 2. f. 1. ♂ (1893) (N. York; descr. of l., p. i.); White, *Ent. News* v. p. 175 (1894) (Brooklyn); Riley, *Insect Life* vi. p. 211 (1894) (larva on celery); Ehrm., *Canad. Ent.* xxvi. p. 292 (1894) (specimen without pupil in ocellus; larva variable); Eimer, *Artb. Verwandtsch. Schmett.* ii. p. 127. t. 7. fig. 10. ♀ (1895); Clevel., *Ent. News* vii. p. 73 (1896) (Oneonta, N.Y.); Fiske, *ibid.* p. 241 (1896) (Webster, N.H., scarce, formerly common, two or three broods); Trum., *ibid.* p. 298 (1896) (Volga, S. Dakota, common); Wright, *Butt. West Coast* ed. ii. p. 89. n. 29. t. 29. ♂, 29b. 29 ♀ (1906) (East. States; Arizona).
- Papilio asterius* var. *ampliata* Ménétriés, *Enum. Corp. Anim. Mus. Petrop., Léop.* ii. p. 99. sub n. 60 (1857) ("Amér. sept. par Motschulsky";—doubtless from Mexico, where Motsch. had made collections).
- Papilio asterioides* Reakirt, *Proc. Ac. Nat. Sci. Philad.* p. 331. n. 27 (1866) (Mexico); Kirby, *l.c.* p. 567. n. 325a (1871).
- Papilio calverleyi* Grote, *Proc. Ent. Soc. Philad.* ii. p. 441. t. 10. ♂ (1864) (New Lots, Queen's Co., Long I., Aug.).
- Papilio* (var. ?) *calverleyi*, Mead, *Amer. Natural.* p. 332 (1869) (♀, Florida, April; abdom. with six rows of yellow spots).
- Papilio polyxenes*, Kirby, *Cat. Diurn. Lep.* p. 566. n. 325 (1871) (*partim*); Grote, *Bull. Buffalo Soc. N. Sc.* i. p. 185 (1873) (in the Southern States the ♂ *polyxenes* seems to approach the ordinary ♀ type); Gerb., *Macro-Lep. N. Amer.* p. 25. n. 451 (1878); Auriv., *K. Sr. Vet. Ak. Handl.* xix. 5. p. 178. n. 23 (1882) (recensio critica;—cit. ex parte ad formam insularem refer.); Staud., *Erot. Tagf.* p. 18. t. 12. ♂ (1884) (*partim*); Scudder, *Butt. East. U.S.* ii. p. 1353. t. 8. fig. 2. 3. t. 27. fig. 3, t. 35. fig. 30, t. 40. fig. 1, t. 57. fig. 2, t. 61. fig. 15. 16, t. 66. fig. 2, t. 72. fig. 11. t. 76. fig. 17. 24. 27, t. 79. fig. 56—60, t. 85. fig. 13. 18. 19 (1889); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 242 (1890) (*partim*; Mexico to Nicaragua); Soule, *Psyche* viii. p. 435 (1899) (colour var. in larvae).
- Amarysius polyxenes*, Scudder, *Proc. Boston Soc. N. H.* xvii. p. 90. n. 18 (1874) (Heart R. Crossing, Yellowstone); Sprague, *Psyche* ii. p. 257 (1879) (Wollaston, Mass., May 18.); id., *l.c.* p. 259 (1879) (Mass., May 18., June 19.).
- Papilio asterias* var. *calverleyi*, Edwards, *Trans. Amer. Ent. Soc.* vi. p. 10. sub n. 12 (1877) (occas., Long I., Florida); Eimer, *Artb. Verwandtsch. Schmett.* ii. p. 131. t. 8. fig. 5. ♂, 6. ♀ (1895) (cop. from Edwards); id., *Orthogen.* p. 31. fig. 9 (1897); Holland, *Butt. Book* p. 314. t. 41. fig. 6. ♀ (1899).
- Papilio asterias* var. *asterioides* (!), Edwards, *Trans. Amer. Ent. Soc.* vi. p. 10. sub n. 12 (1877) (S. States; Arizona; occas. in Northern States).
- Papilio polyxenes* var. *ampliata*, Gerhard, *l.c.*
- Papilio polyxenes* var. *calverleyi*, id., *l.c.*
- Papilio asterius* ab. *calverleyi*, Strecker, *Butt. Moths N. Amer.* p. 72 sub n. 17 (1878).
- Papilio asterius* var. *asterioides*, id., *l.c.*
- Papilio asterioides* (!), Edwards, *Canad. Ent.* xi. p. 85 (1879) (Reakirt's insect not the same as Strecker's; black ♂♂, "Costa Rica" false); Skinner, *Ent. News* xiii. p. 183 (1902) (type "so marked" in coll. of *Amer. Ent. Soc.* is *polyxenes*, not the insect fig. by Strecker as *asterioides*); Wright, *Butt. West Coast* ed. ii. p. 89. n. 30. t. 4. fig. 30. 30b. ♂. ♀ (1906) (Mt. Shasta; Mogave Desert).
- Papilio polyxenes calverleyi*, Scudder, *Butt. East. U.S.* ii. p. 1355 (1889).
- Papilio asterias asterioides* Maynard, *Man. N. Amer. Butt.* p. 8. n. 12a (1891).
- Papilio asterias* var. ♀, *alunata* Skinner & Aaron, *Canad. Ent.* xxi. p. 126 (1889) (Philadelphia ?; submarginal spots of hindwing vestigial above, olive-buff).
- Papilio astyanax*, Scudder (*non* Fabr., 1793, err. det.) *Psyche*, viii. p. 210. t. 5. f. 6, l. juv. (1898).
- Papilio asterias* ab. *calverleyi*, Spengel, *Zool. Jahrb. Abt. Syst.* xii. p. 356. fig. C. D. (1899); id., *l.c.* xiii. p. 205 (1900).
- Papilio polyxenes* Fabr. var. *curvifascia* Skinner, *Ent. News* xiii. p. 183 (1902) (Rincon, N. Mexico).
- Papilio asterias*, Fabr. var. *semi-alba* Ehrmann, *Canad. Ent.* xxxii. p. 348 (1900) (♂, S.W. Penn.).

There is an interesting difference in the degree of variability between the specimens from the Nearctic Region proper and those from the Central American countries. While the North American *males*, with rare exceptions, conform more or less closely to one type, there are three distinct-looking types in the southern districts of the range, two, or in some places all three, occurring promiscuously together, one of them not being distinguishable from the ordinary North American

type. The three forms intergrade completely. The females from Central America are on the whole the same as North American ones. The development in Central America evidently tends towards a black type; the insect is still unstable, the causes which are producing the black type not taking effect in all individuals. It is one of the numerous cases where an insect is on the point of splitting up into some well-marked geographical varieties. We emphasize nomenclatorially the occurrence of the kind of variability mentioned by recording the three types of males under three names.

a. ♂-f. *asterius* Cram., *l.c.*—Both wings with a yellow discal band of spots which enters the cell on hindwing. This is the most widely distributed form occurring from South Canada to South Mexico. The black dot in the anal ocellus is rarely absent. Ehrmann, *l.c.*, records as *semialba* 2 ♂♂ from Pennsylvania in which the spots of the forewing are pure white, while the markings of the hindwing are deep golden yellow.

b. ♂-f. *curvifascia* Skinn., *l.c.*—Shorter winged and shorter tailed than the preceding; discal band broad, but not entering the cell of the hindwing, or there being only a small spot in the cell. This is a form occurring in New Mexico, Vera Cruz and Guatemala, being in the first and last mentioned countries the prevailing if not the only form of the male. Some North American males come very close to it, and there are also West Mexican specimens which are scarcely distinguishable. Standinger's figure of *P. polyxenes*, *l.c.*, represents the present form.

c. ♂-f. *ampliata* Ménétr., *l.c.*; *asterioides* Reak., *l.c.*—Discal spots of fore- and hindwing, above, strongly reduced, partly obsolete, often all absent from forewing. This black form is more common in Guerrero than the ♂-f. *asterius*, intermediate specimens being about as plentiful as ♂-f. *ampliata*. Reakirt's description of *asterioides* applies to specimens with small spots on the forewing. The type specimen of *P. asterioides* preserved in the American Museum is said by Skinner to be "simply an inconstant and accidental variation, and a collector could take a dozen equally as aberrant wherever the species is common." We have not seen a single specimen from North America which agrees with Reakirt's description. The only instance of the occurrence of a black male similar to the female within the United States we know of is recorded by Edwards, *Canad. Ent.* xxiv. p. 49 (1892), who bred a male of that form from a Colorado chrysalis.

The female does not vary so much as the male; the majority of specimens have small yellow discal spots on the upperside, in many individuals these spots are nearly all missing, while in others again the spots are large. The females received from Rincon with the specimens of ♂-f. *curvifascia* are described by Skinner as being like the males, but having the spots on the forewing lighter in colour. We have a female from the same place (received from Mr. G. Franck, of Brooklyn) in which the discal spots of the forewing are obsolete except the upper two or three, the middle spots of the hindwing being also much smaller than in the males from that place. A bred female from Iowa, July 1st, 1897, killed too soon after emergence from the chrysalis, the wings being somewhat crinkly, agrees with ordinary specimens of ♂-f. *asterius*, but the spots are paler and are irregularly stained with black, the band having the appearance of being smeared over with black here and there. A specimen in which the submarginal spots of the hindwing are reduced and of a bluish colour (ab. *alunata*) has been named by Skinner & Aaron, *l.c.* A rare aberration common to both sexes is ab. *calverleyi* Grote, *l.c.*, which is well known

from Edwards' figures. We have a transitional specimen (♀) caught at Passaic, New Jersey (acquired for ourselves by Mr. G. Franck). The forewing is nearly the same above as below, the spots being smaller and the discocellular bar being vestigial. The upperside of the right hindwing is normal, while on the left wing the first submarginal spot and the anal one are enlarged, and the other submarginal spots produced discad, this additional yellow scaling, however, not being conspicuous. On the underside the specimen agrees fairly well with *calceoleyi*.

Hab. of *P. polyxenes asterius*: Honduras to Arizona and Canada, in North America from Arizona and the Mississippi basin to the Atlantic; a black male recorded by Wright from North California.

In the Tring Museum 170 ♂♂, 110 ♀♀, and a series of larvae and pupae from Guatemala northwards.

In coll. Oberthür from Honduras.

d. *P. polyxenes polyxenes* Fabr. (1775).

Papilio Eques Trojanus polyxenes Fabricius, *Syst. Ent.* p. 444. n. 10 (1775) (America); Goeze, *Ent. Beytr.* iii. 1. p. 41. n. 7 (1779); Fabr., *Spec. Ins.* ii. p. 4. n. 13 (1781) (in Americae meridionalis insulis).

Papilio Eques Trojanus asterius (1), Fabricius, *Mant. Ins.* ii. p. 2. n. 13 (1787) (*partim*; = *polyxenes*); Gmelin, *Syst. Nat.* i. 5. p. 2228. n. 280 (1790) (*partim*; in insulis Americae meridionali oppositis).

Papilio asterius, Boisduval & Lec., *Hist. Gén. Léop. Amér. Sept.* p. 14 (1833) (*partim*; Antilles); Boisduval, *Spec. Gén. Léop.* i. p. 332. n. 175 (1836) (*partim*; Antilles); Poey, *Mem. Soc. R. Econ. Habana* p. 235 (1846); Lucas, in Sagra, *Hist. Cuba* vii. p. 205 (1857) (*partim*); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 146 (1863) (*partim*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 315. n. 361 (1864) (*partim*; insular specimens have wider band).

Papilio asterius, Herrich-Sch., *Corr. Bl. Zool. Min. Ver. Regensb.* p. 172. n. 4 (1864) (Habana); Dew., *Zeitschr. Ges. Naturw.* lii. p. 158 (1879) (Cuba, larva); Neum., *Ent. Amer.* i. p. 160 (1885) (Cuba, ♀ resembling ♂); Smith, *ibid.* (1885) (relationship between *asterius*, *asterioides*, and *polyxenes*).

Papilio polyxenes, Kirby, *Cat. Diurn. Lep.* p. 566. n. 325 (1871) (*partim*); Gundl., *Papilio* i. p. 113 (1881) (Cuba); id., *Contr. Ent. Cuba* p. 136 (1881) (*partim*; Western Cuba); Auriv., *K. Sr. Vet. Ak. Handl.* xix. 5. p. 178. n. 23 (1882) (*partim*); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 242. n. 81 (1890) (*partim*; Cuba); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 271 (1897) (diff. from *asterius*).

Papilio asterioides, Eimer (non Reakirt, 1866, err. det.), *Artb. Verwandtsch. Schmett.* ii. p. 121. t. 7. fig. 6. ♂, 7. ♀ (1895) ("Mexico" false); id., *Orthogen.* p. 36. 42. fig. 16 (1897) ("S. Amer.").

There is nothing in the description given by Fabricius in 1775 which points to the insect described being the present insular form; but in 1871 it is stated by him that the insect came from South American islands. As in the case of his *Sphinx lusca*, where the same locality is given, we apply the name to the Cuban form of the species.

♂♀. Very similar to ordinary North American specimens of *P. p. polyxenes*, the discal band of the hindwing broader; the sexes less dissimilar, the female bearing a discal band almost like the male, the band being narrower and somewhat paler; submarginal spots of *underside* rather larger than in *P. p. polyxenes*.

Eimer's figures are a good representation of the two sexes of this insular form. We suspect that Eimer, as in the case of *P. p. americanus*, trusted implicitly in the correctness of the names under which he received the specimens from dealers.*

Hab. Cuba.

The specimens labelled S. Domingo (Tweedie) in the British Museum and

* See p. 417.

in coll. F. D. Godman agree with the North American form; we have not seen fresh material from this island.

In the Tring Museum, 4 ♂♂, 2 ♀♀, from Cuba.

d. P. polyxenes brevicanda Saund. (1868).

- Papilio asterius*, Gosse (non Cramer, 1782, err. det.), *Canad. Natur.* p. 184 (1840) (Newfoundland).
Papilio brevicanda Saunders, in Packard, *Guide Ins.* p. 278 note (1868) (Newfoundland); Kirby, *Cat. Diurn. Lep.* p. 567, n. 325b (1871); Saund., *Canad. Ent.* v. p. 117 (1873) (reply to Strecker's attack); Grote, *Bull. Buffalo Soc. N. Sci.* i. p. 185 (1873) (Anticosti); Edwards, *Canad. Ent.* vi. p. 20 (1874) (larva); Couper, *ibid.* vi. p. 33 (1874) (localities); Couper, *ibid.* vii. p. 18 (1875) (Percé, distr. of Gaspé, north shore of Gulf of St. Lawrence); Bates, *Ent. Mo. Mag.* xi. p. 244 (1875) (Betts Cove and Terra Nova River, Newfoundland, evidently local form of *asterius*); Edw., *Bull. N. Amer.* ii. *Pap.* t. 8 (1875); id., *Trans. Amer. Ent. Soc.* vi. p. 10, n. 11 (1877) (Anticosti; Newfoundland; Quebec; = *anticostiensis*); Kirby, *l.c.* p. 812, n. 325b (1877); Gerh., *Macro-Lep. N. Amer.* p. 25, n. 452 (1878); Edw., *Bull. N. Amer.* ii. *Pap.* t. 8b (1880) (transf.); Gosse, *Canad. Ent.* xv. p. 44 (1883) (Newfoundland, transformation); Gruber, *Zeitschr. Ges. Naturw.* xvii. p. 468 (1884); id., *Papilio* iv. p. 85 (1884) (transf., after Edw.); Seudd., *Bull. East. U.S.A.* iii. p. 1851 (1889); Edw., *Bull. U.S. Nat. Mus.* xxxv. p. 10 (1889) (liter. rel. to transform.); Mayn., *Man. N. Amer. Butt.* p. 8, n. 10, fig. 6c (1891) (Newfoundland; Anticosti; Labrador; Quebec, June); Eimer, *Arth. Verwandsch. Schmett.* ii. p. 136, t. 7, fig. 2. ♂ (1895) (copy from Edwards); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 272 (1897) (= *polyxenes*); Winn, *Canad. Ent.* xxx. p. 304 (1898) (Kamouraska, 85 miles south of Quebec); id., *Rept. Ent. Soc. Ontario* xxix. p. 36 (1899) (range, life list.; 85 miles south of Quebec, on south shore of St. Lawrence; Bic, Rimou-ki Co.; Orleans I., P.Q.; Metis; Kamouraska; all stag-s in August, on *Archangelica*; probably two broods); Fyles, *ibid.* p. 45 (1899) (pupation); Bethune, *ibid.* xxx. p. 104 (1900) (first specim. May 23 in breeding cage); Dyar, *Bull. U.S. Nat. Mus.* lii. p. 3, n. 21 (1902) (N.E. Coast); Lyman, *Canad. Ent.* xxxv. p. 340 (1903) (larva on parsley and other Umbellif.); Brain., *ibid.* xxxvi. p. 52 (1904) (rearing); Lyman, *Rept. Ent. Soc. Ontario* xxxvi. p. 96, n. 21 (1905) (N.-W.-River Post, Hudson Bay; Lake Melville, Ungava).
Papilio polyxenes var. *brevicanda*, Couper, *Canad. Ent.* iv. p. 202 (1872) (Anticosti).
Papilio anticostiensis Strecker, *Lep. Rhop. Hel.* p. 10, t. 2, fig. 2 (1873); id., *l.c.* p. 41 and 49 (1873); id., *l.c.* 68, t. 8, fig. 13, larva (1874); Gerh., *Macro-Lep. N. Amer.* p. 25, n. 453 (1878); Streck *l.c. Suppl.* iii. p. 17 (1900) (2 ♂♂, 2 ♀♀).
Papilio asterius var. *brevicanda*, Strecker, *Bull. Moths N. Amer.* p. 71, sub n. 17 (1878).
Papilio asterius var. *anticostiensis* id., *l.c.*
Papilio mediocanda (!) Eimer, *l.c.* ii. p. 119 (1895).
Papilio mediocanda Eimer, *l.c.* ii. p. 138 (1895) (hab.?, this form or *asterius* ♂-f. *curvifascia*?).

♂♀. Sexes similar. Distal margin of forewing rounded; yellow bar on cross-veins always present; no cloudy yellow spot in front of subcostal fork; discal spots often all of about the same length. Discal band of hindwing curved, usually no spot in cell, the spots often somewhat orange distally; tail shorter than in average specimens of *P. p. asterius*.

For early stages see Edwards, *l.c.* (1880), and Strecker, *l.c.* (1874).

Hab. Newfoundland: Anticosti; Gulf of St. Lawrence; and neighbouring districts, the exact range not being known.

In the Tring Museum 11 ♂♂, 8 ♀♀, from: St. John's, July 1898 (James); Baie St. Claire, Anticosti.

61. *Papilio bairdi* Edw. (1869).

- Papilio bairdi* Edwards, *Proc. Ent. Soc. Philad.* vi. p. 200 (1869) (Arizona); Kirby, *Cat. Diurn. Lep.* p. 567, n. 331 (1871) ("Mexico" false); Mead, in Wheeler, *Rept. Expl. Surv. v. Zool.* 8, p. 740 (1875) (New Mexico; Arizona); Edw., *Trans. Amer. Ent. Soc.* vi. p. 10, n. 10 (1877) (Arizona); Gerh., *Macro-Lep. N. Amer.* p. 25, n. 447 (1878) (N. Mexico); Strecker, *Bull. Moths N. Amer.* p. 72, n. 17a (1878) (Arizona); Edw., *Canad. Ent.* xi. p. 83 (1879) (♀; variability; = var. *utahensis*); id., *Bull. N. Amer.* ii. *Pap.* t. 10, ♂♀ (1880) (Arizona); Mayn., *Man. N. Amer. Butt.* p. 8, n. 11, fig. 6a (1891) (Arizona); Edw., *Canad. Ent.* xxiv. p. 50

- (1892) (W. Colorado); id., *l.c.* xxv. p. 253 (1893) (*oregonia* bred from *bairdi* and the reverse); Haase, *Untersuch. Mimicry* i. p. 92 (1893); Edw., *Canad. Ent.* xxvii. p. 229 (1895) (*oregonia* bred from eggs of *bairdi*, and the reverse); id., *l.c.* p. 241 (1895) (Sioux Co., Nebraska); Eimer, *Arth. Verwandtsch. Schmett.* ii. p. 118. t. 7. fig. 1. ♂, ♀ (1895) (copies from Edw.); id., *Orthogen.* p. 36. fig. 15. ♂, 18. ♀ (1897); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 272 (1897); Buentem., *Journ. N. York. Ent. Soc.* v. p. 101 (1897) (var. of *oregonia*, not of *asterius*); Edw., *l.c.* xxx. p. 11 (1898) (♀ *bairdi* produced *oregonia* (= *brucei*) and *bairdi*); Holland, *Butt. Book* p. 313. n. 14. t. 40. fig. 2. ♂ (1899) (Arizona northwards); Brown., *Ent. News* xii. p. 301 (1901) (Salt Lake City, usually rare); Dyar, *Bull. U.S. Nat. Mus.* lii. p. 3. n. 17 (1902).
- Papilio hippocrates* var. *oregonia* Edwards, *Trans. Amer. Ent. Soc.* v. p. 208 (1876) (Columbia R., ♀).
- Papilio (asterius)* var. *utahensis* Strecker, *Lep. Rhop. Het.* p. 128 (1878) (Utah).
- Papilio asterius* var. *utahensis* id., *Butt. Moths N. Amer.* p. 72. sub n. 17 (1878); id., *Lep. Rhop. Het., Suppl.* iii. p. 17 (1900) (Utah, 2 ♂♂, 1 ♀; var. of *bairdi*; one ♂ with abdomen spotted, the other as in *machaon*).
- Papilio oregonia* Edwards, *Bull. N. Amer.* ii. *Pap.* t. 7. ♂ ♀ (1880) (Oregon); Stretch, *Papilio* ii. p. 119 (1882) (Washington Terr., larva on *Artemisia*, descr.); Edw., *ibid.* iii. p. 56. t. 1. fig. 6. 7. 8. ocellus (1883) (distinct species); id., *Bull. N. Amer.* ii. *Suppl.* p. 1 (1884); Mayn., *Man. N. Amer. Butt.* p. 6. n. 4 (1891) (Oregon; Washington; Vancouver's I.); Edw., *Canad. Ent.* xxiv. p. 52 (1892) (Utah; West Colorado); id., *l.c.* xxvii. p. 241 (1895) (Sioux Co., Nebraska; S.E. Wyoming; Pullman, Washington; Idaho); Christ, *l.c.* ix. p. 273 (1897); Elwes, *Proc. Ent. Soc. Lond.* p. 11. (1897) (= *machaon*); Wright, *Bull. West Coast ed.* ii. p. 87. n. 26. t. 3. fig. 26. ♀ (1906) (Washington).
- Papilio machaon*, Hagen, *Canad. Ent.* xiv. p. 178 (1882) (Washington Terr.).
- Papilio oregonius* (?), id., *Papilio* ii. p. 150 (1882) (cannot be separated from *zolicaon*); Haase, *Untersuch. Mimicry* i. p. 92 (1893).
- Papilio oregonus* (?), Hagen, *Psyche* iii. p. 415 (1882) (Washington Terr., " = *zolicaon* ").
- Papilio hollandi* Edwards, *l.c.* xxiv. p. 50 (1892) (W. Colorado); Holland, *Butt. Book* p. 314. n. 16. t. 40. fig. 3. ♂ (1899) (Arizona; Colorado).
- Papilio brucei* Edwards, *Canad. Ent.* xxv. p. 253 (1893) (name for *oregonia* from Colorado); id., *l.c.* xxvii. p. 239 (1895) (Colorado; " nov. spec. "); id., *Bull. N. Amer., Pap.* iv. (1897) (*brucei* is result of hybridism between *P. oregonia* and *bairdi*!; life history, results of breeding); Elwes, *l.c.* p. 11 (1897) (gradation from *oregonia* through *brucei* to *zolicaon*); Fletch., *Rept. Ent. Soc. Ontario* xxxi. p. 56 (1900) (Regina, Canada; also in the Kootenay Mts. at Kaslo); Burr., *Ent. News* xii. p. 244 (1901) (Yellowstone Nat. Park).
- Papilio machaon oregonia*, Eimer, *Arth. Verwandtsch. Schmett.* ii. p. 109. t. 6. fig. 2 (1895) (copy from Edw.).
- Papilio bairdi oregonia*, Dyar, *l.c.* (1902).
- Papilio bairdi brucei*, id., *l.c.*
- Papilio bairdi hollandi*, id., *l.c.*

♂ ♀. Trichromatic in both sexes, at least in certain districts.

a. f. bairdi Edw., *l.c.*—Similar to *P. polyxenes asterius*, the sexes differing in a similar way as in the ordinary form of that insect. The discal spots are paler on the underside than in *asterius*, and gradually shade off proximally; size of these spots very variable. Many specimens with vestige of yellow lateral stripe posteriorly on abdomen.

b. f. hollandi Edw., *l.c.*—Like the preceding, but the abdomen yellow, striped with black, as in the next form.

c. f. oregonia Edw., *l.c.*; *brucei* id., *l.c.*—Similar in appearance to *P. machaon*; anal ocellus pupilled as in the preceding forms. Colorado specimens (*brucei*) are said by Edwards to be different from Oregon individuals (*oregonia*), but we fail to find any constant distinction, the differences given by Edwards not at all holding good.

This yellow form does not occur in Arizona, the black *f. bairdi* being the only one found there, while the black form has not been met with in Oregon. Polychromatism of a species in one district and monochromatism of the same species in another country is a phenomenon often met with among insects. Edwards had

probably overlooked this fact when he advanced the hypothesis that the variable Colorado insect was the product of a cross between a black (southern) species, *P. bairdi*, and a yellow (northern) species, *P. oregonia*. A parallel case is *P. clytia* of the Oriental Region. The variability of *P. polyxenes* is also similar to that of *P. bairdi*, that species being strongly di- or trichromatic in Mexico, Guatemala, and South America, practically monomorphic (apart from occasional aberrations) in the other districts of the range.

For early stages see Edwards, *l.c.* (1897).

Hab. Arizona and New Mexico (*vide* Mead) northwards, the yellow form extending to Canada (Regina) and British Columbia (Kootenay Mts.), the black form not being known so far north (or is it represented by *P. nitra*?).

In the Tring Museum 20 ♂♂, 3 ♀♀, from: Glenwood Springs, Colorado, June 1901 (Oslar); Thumb Butte, June 1901 (Oslar); Garfield Co.; Beaver, Utah, July; Wickenburg, Arizona, May 1898 (Dr. Kunze); Ozooyoos, British Columbia (Reynolds).

62. *Papilio nitra* Edw. (1883).

Papilio nitra Edwards, *Papilio* iii, p. 158, 162 (1883) (Judith Mts., Montana); Fletcher, *Canad. Ent.* xix, p. 225 (1887) (Rocky Mts.; Regina, N.W.T.); *id.*, *Rept. Ent. Soc. Ontario* xviii, p. 25 (1888) (Regina, N.W.T.; Rocky Mts.); Edw., *Bull. N. Amer.* iii, *Pap.* t. 1, ♂♀ (1889) (Canmore, June, on the summit; Regina; Montana, July); Mayn., *Man. N. Amer. Butt.* p. 6, n. 7 (1891) (Montana); Christ, *Mitt. Schweiz. Ent. Ges.* ix, p. 273 (1897); Holland, *Bull. Book* p. 312, n. 11, t. 41, fig. 2, ♂ (1899); Dod, *Canad. Ent.* xxxiii, p. 171, n. 80 (1901) (Alberta, June); Baird, *Rept. Ent. Soc. Ontario* xxxiii, p. 93 (1903) (High River, Alta).

Papilio nitra nitra, Dyar, *Bull. U.S. Nat. Mus.* li, p. 3, n. 20a (1902).

This insect resembles *P. bairdi f. bairdi*, but is shorter winged. It is restricted to Montana and Western Canada, and is said to occur there together with *P. zelicaon* and *P. bairdi f. oregonia*. We believe these *oregonia* to be the yellow form of *nitra*. We have not seen Canadian *oregonia*, but have two females from Ozooyoos, British Columbia. These females are shorter winged than our Colorado specimens and than Edwards's figures of Oregon individuals, and have the abdominal margin of the hindwing more extended black. Canadian *oregonia* may be similar to these Ozooyoos specimens, which would render it probable that there is really such a connection between the black and the yellow Canadian specimens as here suggested. Breeding will decide the question. *P. nitra* is quite distinct from *nitra*.

The sexes are similar, the yellow markings being rather paler in the female than in the male (they are too pale in Edwards's figure). The size of the markings is variable, also the extent and intensity of orange on the underside of the hindwing.

Early stages and food-plant not known.

Hab. West Canada; Montana.

In the Tring Museum 4 ♂♂, 1 ♀, from: Red Deer, Alberta, June 1903; Didsbury, Alberta, June 1904.

63. *Papilio zelicaon* Lucas (1852).

Papilio zelicaon Lucas, in Guér., *Rev. Zool.* (2), iv, p. 136 (1852) (California); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* ii, p. 529 (1852); Gray, *Cat. Lep. Ins. Brit. Mus.* i, *Pap.* p. 37, n. 182 (1852) (Calif.); *id.*, *List Lep. Ins. Brit. Mus.* i, *Pap.* p. 51, n. 190 (1856); Lucas, *Bull. Soc. Ent. France* p. 67 (1856) (distinct from *machaon*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv, p. 315, n. 358 (1864) (California;—"Labrador; Missuri?" ad aliam spec. refer.).

Papilio zelicaon (!) Boisduval, *Ann. Soc. Ent. France* p. 281, n. 3 (1852) (California); Vollenh.,

- Tijdschr. Ent.* iii. p. 84. n. 122 (1860) (S. Francisco); Morris, *Syn. Lep. N. Amer.* p. 4. n. 5 (1862) (California); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 148 (1863) ("Labrador" false; U. States; hardly more than a variety of *machaon*); Kirby, *Cat. Diurn. Lep.* p. 566. n. 321a (1871) (California); Couper, *Canad. Ent.* vi. p. 34 (1874); Strecker, *Lep. Rhop. Het.* p. 46. t. 6. fig. 3. ♀ (1873); Edw., *Proc. Cal. Ac. Sc.* v. p. 163 (1873) (larva, pupa); Mead, in Wheeler, *Rept. Expt. Surv. v. Zool.* 8, p. 740 (1875) (Colorado); S. Utah); Edw., *Bull. N. Amer. ii. Pap.* t. 6. ♂. ♀. l. p. (1875) (Vancouver's I. to Lower California; Arizona; Colorado; Montana; Idaho); Kirby, *l.c.* p. 812. n. 321a (1877); Edw., *Trans. Amer. Ent. Soc.* vi. p. 10. n. 7 (1877) (Oregon to Arizona; Montana; Colorado); Gerh., *Macro-Lep. N. Amer.* p. 25. n. 449 (1878); Strecker, *Bull. Moths N. Amer.* p. 71. n. 14 (1878); Oberth., *Et. d'Ent.* iv. p. 68. n. 194 (1880) (Calif.; Canada); Hagen, *Psyche* iii. p. 415 (1882) (Washington Terr., "var. of *machaon*"); Edw., *Papilio* iii. p. 48. t. 1. fig. 4. 5. ocellus (1883) (distinct from *machaon oregonia*, etc.); Lyman, *Papilio* iii. p. 109 (1883) (var. ♀, Nevada); Butl., *Journ. Linn. Soc. Lond.* xvi. p. 472. n. 59 (1883) (Mendocino); Edw., *Papilio* iv. p. 162 (1884) (early stages; mostly one brood only); Behr, *Bull. Cal. Ac. Sc.* i. p. 64 (1884) (Calif., common, l. on *Oenyanthe, Angelica, Carum*); Edw., *Bull. N. Amer. ii. Suppl.* p. 1 (1884) (S. Bernardino; near *asterias*); id., *Bull. U.S. Nat. Mus.* xxxv. p. 9 (1889) (liter. relating to metam.); id., *Bull. N. Amer. iii. Pap.* t. 3. fig. a-g (1891) (transform.); Riley, *Insect Life* iii. p. 412 (1891) (parasite: *Apanteles*); Mayn., *Man. N. Amer. Butt.* p. 6. n. 5 (1891); Foster, *Canad. Ent.* xxiv. p. 192 (1892) (Marshall Pass, Colorado, 10-13,000 ft.); Haase, *Untersuch. Mimicry* i. p. 92 (1893); Oslar, *Ent. News* iv. p. 226 (1893) (Los Angeles, Fehr.); Cockerell, *Trans. Amer. Ent. Soc.* xx. p. 353. n. 647 (1893) (Rosita, Colorado); Danby, *Journ. N. York Ent. Soc.* ii. p. 33 (1894) (Vancouver I., scarce); Wiley, *Ent. News* v. p. 38 (1894) (Miles City, Montana, rare); Snyder, *ibid.* v. p. 167 (1894) (Park City, Utah); Jordan, *Canad. Ent.* xxvi. p. 257 (1894) (Napa, Calif.; metam.); Cunningh., *Ent. News* vi. p. 251 (1895) (Ft. Klamath, Oregon); Eimer, *Arb. Verwandsch. Schmett.* ii. p. 109. t. 6. fig. 5 (1895) (California); Walk, *Proc. Ent. Soc. Lond.* p. 11 (1897) (Vancouver I., larva and pupa not distinguishable from those of *machaon*); Twog., *Ent. News* viii. p. 31 (1897) (Riverside, Calif., rare, late Febr. & March); Snyder, *ibid.* viii. p. 164 (1897) (Utah); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 270 (1897); Holland, *Bull. Book* p. 312. n. 10. t. 38. fig. 1. ♂ (1899) (Vancouver I. to Arizona and Colorado); Denton, *Moths Butt. N. Amer.* ii. p. 350. fig. ♂ (1898-1900); Dod, *Canad. Ent.* xxxiii. p. 171. n. 79 (1901) (Alberta, June); Brown., *Ent. News* xii. p. 301 (1901) (Salt Lake City, usually scarce, np to 9500 ft.); Dyar, *Proc. U.S. Nat. Mus.* xxvii. p. 782 (1904) (Kootenai); Dennis, *Rept. Ent. Soc. Ontario* xxxiv. p. 90 (1904) (Beulah, Manitoba); Wright, *Bull. West Coast* ed. ii. p. 86. n. 24. t. 3. fig. 24 (1906) (as far north as Wrangel, Alaska).
- Papilio machaon*, Ménétrics, *Enum. Corp. Anim. Mus. Petrop., Lép.* i. p. 4. n. 58 (1857) (*partim*; California).
- Papilio machaon* var. *californica*, id., *l.c.*, *Lép.* iii. p. 69. n. 58 (1863) ("= *zelicaon* Lucas").
- Papilio dolicaon* (?), Behr, *Stett. Ent. Zeit.* xxvii. p. 216 (1866) (Calif.).
- Amaryssus zelicaon*, Scudder, *Proc. Boston N. H. Soc.* xvii. p. 90. n. 19 (1874) (Yellowstone, July 18).
- Papilio zelicaon* (?), Dyar, *l.c.* (1902) (sub syn.).
- Papilio colbro* Wright, *l.c.* p. 86. n. 25. t. 3. fig. 25. ♂ (1906) (Colorado Desert, S.E. Calif.).

There may be a closer connection between the present insect and *Papilio nitra* than we suspect. But until positive proof by breeding is forthcoming, *P. zelicaon* should be treated as a separate species. Lucas's name *zelicaon* has priority over *zelicaon* of Boisduval.

The species is more constant than any of the allied forms. However, there occur promiscuously in a series some inconspicuous but significant deviations from the ordinary type. The pattern of the abdomen is by no means so constant as Edwards, *l.c.* (1883), stated it to be. The broad black dorsal stripe bears occasionally at its lateral edges on segments 4, 5 and 6 a yellow dot partly separated from the yellow side-stripe, these dots being homologous of the respective dots found in both *Papilio nitra* and *P. bairdi* f. *bairdi*. The underside of the abdomen is usually quite black, many individuals, however, bearing posteriorly on each side a vestige of a yellow stripe. These stripes are sometimes quite distinct, extending almost to the base of the abdomen in some females, there being occasionally also a thin yellow mesial line on the posterior segments.

The variability in size is not inconsiderable, the forewing measuring from 34 to 46 mm. in length in our males, and from 35 to 50 mm. in our females. The cloudy spot in front of the subcostal fork of the forewing assumes sometimes a distinct blue tint; the black dot within the fork is occasionally very small, rarely absent; the yellow cell-bar varies much in size, being vestigial in one of our numerous specimens from Mount Shasta, a male, the posterior discal patches being in this individual also rather smaller than usual. The amount of black at the base and behind the cell of the hindwing is variable; the yellow colour extends usually to the base of the cell, but the basal fourth or third of the cell is sometimes black; the width of the black distal border is quite inconstant. The cell of the forewing is, in some individuals, distinctly striped with pale yellow; some specimens have hardly any orange colour on the disc of the hindwing, while others bear conspicuous orange patches. Deep yellow individuals are *ab. coloro* Wright.

For early stages see Edwards, *l.c.*

Hab. Alaska, British Columbia, Alberta, southwards to Arizona and Colorado.

In the Tring Museum 95 ♂♂, 27 ♀♀, from: Qu'Appelle, Assiniboia, June 1901; Ozoyoos, British Columbia (Reynolds); Gold Hill, Oregon, May—July 1901 (Biedermann); Quincy, California, 3400 ft., May 1896 (Watson); Truckee, California, 6000 ft.; McCloud R., Shasta Co., June 1884 (O. T. Baron); Butte Creek, Butte Co., May 1898 (Mrs. Austin); Davis Creek, Madoc Co., 4500 ft., July 1898 (Mrs. Austin); N. Tulare R., California, July 1897 (Purpus); Siskiyou Co., California (O. T. Baron); Reno, Nevada; Chimney Gulch, Colorado, May 1901 (Oslar); Garfield Co. and Park Co., Colorado.

In coll. H. J. Adams from Calgary.

64. *Papilio indra* Reak. (1867).

♀. *Papilio indra* Reakirt, *Proc. Ent. Soc. Philad.* vi. p. 123 (1867) (Colorado, Pike's Peak).

♂♀. Sexes similar. Body black; a line bordering the mesothoracic tegula and extending forward, ending behind antennae, creamy, often somewhat ochraceous; abdomen either wholly black, or the last segments laterally creamy, or there is a creamy stripe of variable width from base of abdomen to claspers, the stripe being situated laterally on the tergites, the claspers remaining always black.

The colour of the creamy markings of the wings darkens by exposure to light, as in other pale yellow species.

Forewing.—There are usually two creamy bars across the cell, either of which or both may be wanting; the discal band is very variable in width, the submarginal spots also varying much in size; in fresh specimens the basal third of the wing is powdered with creamy scales. The discal band of the hindwing stands either outside the cell, being narrow, or enters the cell, occupying sometimes as much as the apical third of the cell; the submarginal spot M^1 — M^2 is often absent; the anal orange spot (submarginal and marginal spots M^1 — SM^2 merged together) is always centred with black; the orange ring is usually complete, but in a small percentage of specimens it is interrupted on the abdominal side, being occasionally open also on the discal side, in which case the orange submarginal spot stands separate from the marginal one like the other submarginal spots; the discal spot R^2 — M^1 is acuminate, often also the spot in front of it, both being somewhat prolonged on the *underside*, and in many specimens stained with orange distally.

Genitalia: ♂. Saw of harpe longer than, or at least as long as, the proximal non-serrate portion of the harpe; this non-serrate portion compressed, elevate, forming a sharp ridge which is highest before joining the saw, being here somewhat curved ventrad; the saw itself somewhat curved dorsad proximally; the teeth small and close together.—♀ not dissected.

Early stages noticed by Edwards, *l.c.* (1897).

a. P. indra indra Reak. (1867).

Papilio indra Reakirt, *l.c.*; Kirby, *Cat. Diurn. Lep.* p. 567. n. 337 (1871); Strecker, *Lep. Rhop. Het.* p. 9. t. 2. f. 1 (1873) (Pike's Peak); id., *Proc. Ac. N. Sc. Philad.* xxviii. p. 150 (1876) (♀, Clear Creek, Colo., July 1); Putn., *Proc. Daveup. Ac. Nat. Sci.* i. t. 35. fig. 5. ♀ (1876); Kirby, *l.c.* p. 812 (1877); Edw., *Trans. Amer. Ent. Soc.* vi. p. 10. n. 8 (1877) (Colorado; Nevada); id., *Butt. N. Amer.* ii. *Pap.* t. 9. ♂. ♀ (1878); Gerh., *Macro-Lep. N. Amer.* p. 25. n. 454 (1878); Strecker, *Butt. Moths N. Amer.* p. 71. n. 15 (1878) (Colorado); Edw., *Papilio* iii. p. 2 (1883) (Boulder, Colo.); Butl., *Journ. Linn. Soc. Lowl.* xvi. p. 472. n. 62 (1883) (Siskiyou Co.); Mayn., *Man. N. Amer. Butt.* p. 7. n. 8. fig. 6. d (1891) (Colorado; Nevada; California); Bruce, *Canad. Ent.* xxiii. p. 110 (1891) (Colorado, June, 7000 ft.); id., *Ent. News* viii. p. 134 (1897) (Denver, Colo., May 4); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 272 (1897); Edw., *Butt. N. Amer.* iii. *Suppl.* p. i. (1897) (egg and larva noticed; food plant, *Artemisia*); Holland, *Butt. Book* p. 312. n. 12. t. 41. fig. 3. ♀ (1899) (mountains of Colorado, Nevada, California); Denton, *Moths Butt. U.S. Amer.* ii. p. 350 (1898—1900); Snyder, *Ent. News* xi. p. 365 (1900) (Silver Lake, Utah); Strecker, *Lep. Rhop. Het., Suppl.* iii. p. 17 (1900) (♀, Clear Creek Cañon); Brown., *Ent. News* xii. p. 301 (1901) (Salt Lake City, quite rare, 6000 ft.). Dyar, *Bull. U.S. Nat. Mus.* liii. p. 3. n. 20 (1902) (*partim*); Wright, *Butt. West Coast* ed. ii. p. 87. n. 27. t. 4. fig. 27. ♂, 27b. ♀ (1906).

♂ ♀. Tail short.

Hab. California; Nevada; Utah; Colorado.

In the Tring Museum 122 ♂♂ from: Siskiyou Co., California (O. T. Baron); McCloud R., Shasta Co., June 1884 (O. T. Baron); Chimney Gulch, Colorado, May and June 1900 and 1901 (Osler).

A ♀ in coll. H. J. Adams.

b. P. indra pergamus Edw. (1875).

Papilio pergamus Edwards, *Proc. Calif. Ac. Sci.* v. p. 423 (1875); Kirby, *Cat. Diurn. Lep.* p. 813. n. 383 (1877); Edw., *Trans. Amer. Ent. Soc.* vi. p. 10. n. 9 (1877) (S. California); Strecker, *Butt. Moths N. Amer.* p. 71. n. 16 (1878) (California); Mayn., *Man. N. Amer. Butt.* p. 7. n. 9 (1891) (S. California); Beutenm., *Bull. Amer. Mus. N.H.* iv. p. 167 (1892) (type in Amer. Mus., ♂, S. Barbara); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 273 (1897) (= *indra*); Wright, *Butt. West Coast* ed. ii. p. 88. n. 28. t. 4. fig. 28. ♂, 29b. ♀ (1906) (S. California, 2000—3000 ft.).

♂. Tail longer than in the preceding form.

Hab. South California, coast range.

In the Tring Museum 2 ♂♂, June and July.

65. *Papilio machaon* L. (1758).

Papilio Eques Achirus machaon Linné, *Syst. Nat.* ed. x. p. 462. n. 27 (1758).

This species is represented in America by the following subspecies:

a. Papilio machaon alaska Seudd. (1869).

Papilio machaon, Edwards, *Canad. Ent.* i. p. 22 (1868) (Rupert House, Hudson Bay); Strecker, *Butt. Moths N. Amer.* p. 70. n. 13 (1878); id., *Butt. N. Amer.* ii. *Pap.*, in text for t. 7 (1880) (Dalles).

Papilio alaska Seudder, *Proc. Boston N. H. Soc.* xii. p. 407 (1869) (Nulato, May 29—June 14; also E. coast of Hudson Bay); Kirby, *Cat. Diurn. Lep.* p. 566. n. 321b (1871); id., *l.c.* p. 812. n. 321b (1877); Gerh., *Macro-Lep. N. Amer.* p. 25. n. 450 (1878); Holland, *Butt. Book* p. 312. n. 9. t. 41. fig. 1 ♂ (1899) (only in Alaska).

Papilio machaon var. *alaska*, Edwards, *Papilio* ii. p. 75 (1882) (Hudson Bay; Alaska; common at St. Michael's on coast above outlet of Yukon R.; Dalles, Columbia R.); id., *l.c.* iii. pp. 58, 60 (1883) (=Himalayan form, false); Webster, *Canad. Ent.* xxvi. p. 117 (1894) (Alaska, eastw. to Hudson Bay); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 270 (1897); Lyman, *Canad. Ent.* xxxii. p. 119 (1900) (Dawson, Yukon); Staud. & Reb., *Cat.* ed. iii. p. 2. n. 4h (1901) (Alaska).
Papilio machaon alaska, Maynard, *Man. N. Amer. Butt.* p. 6. n. 3a (1891) (Oregon northwards); Dyar, *Bull. U.S. Nat. Mus.* lii. p. 3. n. 16a (1902) (Alaska; North Pacific States); Wilson, *Rept. Ent. Soc. Ontario* xxxiv. p. 90 (1904) (Nagagami R., Hudson Bay slope); Keele, *ibid.* xxxv. p. 16 (1904) (common along the shores of Mayo Lake, and valley of Mayo R., Yukon Terr., July & August).

The black band of the hindwing is broader than in *P. machaon kamtschadalis* Alphér. (1897). The anal ocellus is always blind as in the other forms of *P. machaon*, the black admarginal spot standing at the distal side of the orange spot, not within it.

The insect is rare in European collections. Sometimes one finds as *alaska* and *oregonia* Old-World specimens of *P. machaon* in collections. We have received ourselves from America two *machaon*, of which one is undoubtedly a Sikhim individual and the other a British one.

Hab. Alaska; Oregon; Hudson Bay.

In the Tring Museum one bad ♂.

VI. Thoas Group.

Underside of thorax and abdomen not striped with black, being either all yellow, or black dotted with yellow laterally or bearing a yellow lateral line. Hindwing beneath from base to disc yellow or black, no black bands forming a large V; PC at two-thirds or nearer apex of basal cellule, the latter not much produced.

Young larvae with dorsal tubercles which are replaced by small circular spots in later stages; adult larvae with yellowish side-stripe on thoracical segments, a very large pale dorsal or dorso-lateral patch occupying the central segments (V-shaped or mesially divided) and a large side-patch on the last segments tapering in front, these markings rather ill-defined.

Key to the species:

- | | |
|--|-----------------|
| a. Tail with yellow spot in centre of widened apical portion | b. |
| Tail without yellow spot in centre on upperside | e. |
| b. Forewing beneath without black band across cell | c. |
| Forewing beneath with black band across cell continued to hindmargin | d. |
| c. Discal patch R^2-R^3 of forewing projecting much beyond patch R^3-M^1 ; dilated part of tail rounded; tenth tergite of ♂ bifurcate, the projections curving laterad | Species No. 67. |
| As before; spatule of tail more elongate; tenth tergite of ♂ short, simple | Species No. 68. |
| Discal patch R^2-R^3 of forewing very little projecting beyond patch R^3-M^1 ; cell often with yellow spot, striped with yellow and black beneath; spatule of tail elongate; tenth tergite of ♂ long | Species No. 66. |
| d. Yellow band of forewing parallel to distal margin | Species No. 73. |
| Yellow band of forewing interrupted, both portions oblique, the posterior portion continuous with the broad cell-bar | Species No. 74. |

- e.* Wings black, with a row of sharply defined submarginal spots, first spot on forewing standing in front of SC^1 , being about 5 mm. distant from distal margin; cell all black; hindwing with an orange-red spot R^3-M^1 close to cell, sharply defined Species No. 70.
 Wings at least partly yellow, or the disc much paler than the base, or hindwing more or less blue on upperside; submarginal spots of forewing absent from black specimens (which are all ♀♀), or the spot SC^3-SC^4 absent or close to margin; or rufous-orange spots on underside of hindwing in a row which is separate from cell *f.*
- f.* A regularly curved row of blue halfmoons on disc of hindwing beneath, preceded by a row of rufous or orange halfmoons which are distant from cell *g.*
 Hindwing beneath with a row of sharply defined rufous or orange spots around apex of cell; no yellow spot in cell of forewing on upperside Species No. 69.
 Hindwing beneath with an irregular, but complete, row of metallic blue spots on disc, spot R^3-M^1 being more distal than the others; the rufous red spots preceding the blue ones ill-defined, often vestigial; no spot in cell of forewing on upperside Species No. 72.
- g.* Hindwing with sharply marked yellow submarginal spots on upperside, at least in ♂; in ♀ disc not greenish blue, without large greenish patches *h.*
 Submarginal halfmoons of upperside of hindwing thin, always washed over with black in ♂; these spots blue or green in ♀; disc also blue or green or buffish green Species No. 78.
- h.* Cell-patch of ♂ on forewing above produced basad beyond point of origin of M^2 , occupying about one-third of the cell; no submarginal spots on upperside of forewing; ♀ with curved yellow band from costal to hinder margin on upperside of forewing Species No. 75.
 ♂ without patch in cell on upperside of forewing; on underside of forewing a row of small spots between discal band and submarginal spots; submarginal spots of upperside of hindwing vestigial in ♀, being washed over with brown; forewing with yellow markings in costal area, but no pale shadowy band on disc Species No. 76.
 ♂ with patch in cell of forewing on upperside; ♀ with pale band on forewing or the disc much paler than the area from base to apex of cell, especially on underside Species No. 77.

66. *Papilio thoas* L. (1771).Seba, *Thesaur.* iv. p. 46. t. 38, fig. 6. 7. (1764).*Papilio Eques Achicus thoas* Linné, *Mant. Plant.* p. 536 (1771) (*partim*).*Papilio thoas*, Godart, *Enc. Méth.* ix. p. 62. n. 103 (1819) (*partim*); Boisdu, *Spec. Gén. Léop.* i. p. 355.n. 197 (1836) (*partim*); Kirby, *Cat. Diurn. Lep.* p. 541. n. 155 (1871) (*partim*); Haase, *Untersuch. Mimicry* p. 96 (1893).*Heraclides thoas*, Kirby, in Allen's *Nat. Libr., Lep. Butt.* ii. p. 282 (1896).

The various subspecies vary so much *inter se*, and each is again individually so variable, that there is no single character in the pattern found in all forms by which to distinguish the entire species *P. thoas* from its near relative *P. cresphontes*. The genitalia are more uniformly developed in all subspecies of *P. thoas*. The tenth tergite of the ♂ is always long, spatulate; the tenth sternite has on each side a long, pointed, thornlike process, which bears proximally at the base a ridge or broad tooth; the clasper is slightly acuminate, being much less rounded than in *P. cresphontes* and dorsally less emarginate; the harpe, with the exception of the Jamaica form, gradually narrows into a long point, being subtruncate and denticulate in the Jamaican subspecies. The vaginal armature of the female is geographically somewhat variable like the genitalia of the male; the organs are similar to those of *P. cresphontes*, but there is proximally of the vaginal orifice on each side a broad and rather strongly chitinised depression, the edge of which projects as an irregular ridge.

Early stages essentially as in *P. cresphontes*, the tubercles of the head and thorax of the chrysalis shorter.

Hab. Texas to Buenos Aires; Cuba; Jamaica; not yet known from Haiti and Porto Rico, where the species may be expected to occur.

a. P. thoas meloni subsp. nov. (Pl. VIII. fig. 59).

Papilio Eques Achirus cresphontes Cramer, *Pap. Esot.* ii. p. 106 (1777) (*partim*; Jamaica).

Papilio cresphontes, Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 169 (1846) (*partim*; Jamaica); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 53. n. 204 (1856) (*partim*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 294 (1864) (*partim*; Jamaica); Butl., *Proc. Zool. Soc. Lond.* p. 481. n. 37 (1878) (Jamaica).

♂ ♀. A remarkably distinct form, usually of small size, resembling small specimens of *P. cresphontes*.—Yellow markings of *upperside* pale; forewing: discal patch R^2-R^3 as in *P. cresphontes* much longer than the following patch; patch M^1-M^2 acuminate distally; no spot in cell; three submarginal spots, occasionally preceded by one or two small dots; patch SC^5-R^1 entire or nearly, but sometimes deeply sinuate.—Hindwing: yellow marginal abdominal spot large, continuous with the orange-red halfmoon, at the proximal side of which there is a blue crescent; spot on tail small in male.

Underside, forewing: submarginal spots R^3-M^2 much larger than the others, spot M^1-M^2 being the largest, spot R^2-R^3 about the same size as spot M^2-SM^2 or smaller.—Hindwing: three large orange patches R^2-M^1 , sharply defined, the third being the longest, being more than half the length of the pale yellow submarginal patch R^3-M^1 ; a complete series of pale blue spots, all the same pure colour; occasionally some orange scaling in apex of cell and behind SC^2 ; orange anal halfring larger than in the other forms of *P. thoas*.

Genitalia: ♂. Tenth tergite long, much slenderer than in the other subspecies, strongly spatulate, longitudinally grooved beneath, not carinate; long pointed process of sternite straight, the hairy tooth at base of this process small; harpe quite different from that of all other subspecies, being short, subtruncate, with the apex denticulate.—♀. Anterior edge of vaginal orifice not tubercleiform, on each side of the orifice a ridge, and behind the orifice two double ridges.

Hab. Jamaica.

In the Tring Museum 6 ♂♂, 3 ♀♀.

Also in coll. Grose-Smith and coll. Adams.

b. *P. thoas oviedo* Gundl. (1866).

Papilio thoas, Lucas, in Sagra, *Hist. Cuba* vii. p. 206 (1857) (*partim*?).

Papilio cresphontes, Herrich-Sch., *Corresp. Bl. Zool. Min. Ver. Regensb.* p. 173 sub n. 5 (1864) (*cresphontes* = *oviedo* Gundl. i. litt., false); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 294 (1864) (*partim*; Cuba).

Papilio oviedo Gundlach, in Poeey, *Rep. Fis. Nat. Cuba* i. p. 279. t. 5. fig. 1 (1866); id., *Contr. Ent. Cuba*. p. 133 (1881).

Papilio thoas var. c. *P. oviedo*, Kirby, *Cat. Diurn. Lep.* p. 541. sub n. 155 (1871) (Cuba).

Papilio thoas var. *oviedo* Gundlach, *Papilio* i. p. 113 (1881).

Papilio cresphontes var. *oviedo* id., *Berl. Ent. Zeit.* xxx. p. 132 (1886).

Papilio epithoas Oberthür, *Bull. Soc. Ent. France* p. 179. fig. 5 (1897) ("Mexico?").

Papilio thoas var. *P. epithoas*, Godman & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 729 (1901).

♂ ♀. *Upperside*: markings deeper yellow than in the preceding; discal band broad, especially in male; forewing: patches R²—M² of nearly equal length; four large submarginal spots preceded by one, two, or three smaller ones.—*Hindwing*: yellow anal spot large, continuous with red halfmoon, a blue spot at the proximal side of the latter.

Underside much deeper yellow than in all other forms of *P. thoas*; black colour on forewing much reduced.—*Hindwing*: two orange-red spots R²—M¹, sharply defined, not so large as in the Jamaica form, but larger than in continental specimens of *P. thoas*; a row of large pale blue discal spots, the middle ones partly yellow, especially spots R²—M¹; anal crescent only slightly reddish, sometimes the same colour as the other submarginal spots; spot on tail large above and below.

Genitalia: ♂. Tenth tergite spatulate, being constricted before apex, shorter than in continental specimens, carinate beneath, broader than in *P. thoas melonius*; acute process of sternite comparatively short, curved; harpe long, gradually tapering to a point.

Hab. Cuba.

The deep maize-yellow underside and the large blue patches of the hindwing are the most distinctive external features of this insect, which cannot easily be confounded with *P. cresphontes*.

In the Tring Museum 2 ♂♂, 2 ♀♀, from: Cuba (Gundlach); Gibara (Tollin).

c. *P. thoas autocles* subsp. nov.

Papilio thoas, Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 54. n. 206 (1856) (*partim*; Mexico; Yucatan; Nicaragua); Reak., *Proc. Ent. Soc. Philad.* ii. p. 138. n. 6 (1863) (Nicaragua; syn. *partim*); Weidem., *ibid.* ii. p. 148 (1863) (*partim*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 295 (1864) (*partim*; Mexico; Yucatan; Nicaragua?); Oberth., *Et. d'Ent.* iv. p. 70. n. 210 (1880) (*partim*; Mexico); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 223. n. 53. t. 69. fig. 4. genit. (1890) (*partim*); Mayu., *Man. N. Amer. Butt.* p. 14. n. 21. fig. 10b (1891) (S. Arizona; Texas; "probably Florida"; *partim*?); Holland, *Butt. Book* p. 311. n. 7 (1899) (*partim*; Texas;—t. 42. fig. 4. alia subsp.); Denton, *Moths Butt. U.S.A.* ii. p. 345 (1898—1900) (*partim*; occasionally in Texas;—fig. ad sequent. subsp. referendae); Godm. & Salv., *l.c.* p. 729 (1901) (Honduras).

Papilio cresphontes, Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 294 (1864) (*partim*; Mexico; Honduras).

Papilio ornythion, Staudinger (*non* Boisid., 1836, err. det.), *Exot. Tugf.* p. 16 (1881) (Mexico; "if my specimen is true *ornythion*, the latter is var. of *thoas*").

♂ ♀. Paler than *P. cresphontes*, with which it occurs together, being also paler than the other continental forms of *P. thoas*.—*Upperside*, forewing: no spot in cell or only a vestigial one; patch SC⁵—R¹ deeply excised, rarely without black sinus or spot; spots before upper angle of cell small; four submarginal spots,

rarely three, sometimes a complete series, the upper ones being small; last spot usually distinctly smaller than the third (from behind).

On *underside* the last submarginal spot of the forewing smaller than the fourth spot (counted from behind), the third spot being the largest; cell almost entirely pale primrose-colour, the black streaks being either short or indistinct.

Genitalia: ♂. Tenth tergite broad, narrowing apicad, constricted before apex; pointed process of sternite curved, the hairy ridge standing at its base shortened to a tooth; harpe long, gradually narrowed to a point.

Hab. Texas to Nicaragua; name-type from Guerrero.

In the Tring Museum 50 ♂♂, 7 ♀♀, from: Houston, Texas; Jalapa, July 1897 (W. Schaus); Cordoba, February 1896 (W. Schaus); Songolica, July 1896 (W. Schaus); Cuesta de Misantla, June 1896 (W. Schaus); Guerrero (O. T. Baron); Mexico City (ex coll. Felder); Escuintla, W. Guatemala, 1100 ft., September 1904 (A. Hall); San Pedro Sula, Honduras.

In coll. F. D. Godman 6 ♂♂, 2 ♀♀ from Nicaragua, and a long series from more northern localities.

d. P. thoas nealces subsp. nov.

Papilio (Acheivus) ajax, Müller (*von* Linné, 1758, err. det.), *Naturs.* v. p. 575. n. 32. t. 17. fig. 3 (1774).

Papilio thoas, Kollar, *Deutschr. K. Ak. Wiss. Wien, Math. Nat. Cl. i.* p. 355. n. 11 (1850) (Rio Meta, smaller than Brazilian); Gray, *Cat. Lep. Ins. Brit. Mus. i.* p. 39. n. 196 (1852) (*partim*; Venezuela); Butl. & Druce, *Proc. Zool. Soc. Lond.* p. 365. n. 377 (1874) (Costa Rica); Oberth., *Et. d'Ent.* iv. p. 70. n. 210 (1880) (*partim*; Muzo; Carare; Caracas); Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 125. n. 245 (1880) (Sta. Marta); Walk., *Ent. Mo. Mag.* xix. p. 26 (1882) (Panama, common, a fast flyer); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 223. n. 53 (1890) (*partim*); Maas. & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 11. n. 41 (1890); *iid.*, *l.c.* p. 18. n. 31 (1890); *iid.*, *l.c.* p. 24. n. 106 (1890) (west side of Cordillera of Bogota); *iid.*, *l.c.* p. 32. n. 135 (1890) (Colombia); *iid.*, *l.c.* p. 66. n. 24 (1890) (Guayaquil); Hahnel, *Iris* iii. p. 149 (1890) (San Esteban); *id.*, *l.c.* p. 201. 205 (1890) (Valera, Venez.); Eimer, *Orthogen. Schmett.* p. 138. fig. 63 (1897) (Neu-Grauada); Dent., *Moths Butt. U.S.A.* ii. p. 345. figs. (1898—1900) (*partim*;—the figures apparently taken from Costa Rica specimens); Kaye, *Trans. Ent. Soc. Lond.* p. 207. n. 198 (1904) (Trinidad).

♂♀. In colour intermediate between the preceding and the following form, being deeper yellow than *P. t. autocles* and paler than *P. t. thoas*.—*Upperside*, forewing: cell-spot conspicuous in nearly all specimens; small spots in front of apex of cell larger than in the preceding form, but smaller than in the following one; four submarginal spots, rarely three only, the row sometimes continued by one, two, or three small spots, last spot about as large as the third (from behind), or larger.

Underside: submarginal spots of forewing larger than in *P. t. thoas*, especially the upper ones, last spot usually about the same size as the fourth (from behind), often larger; cell with distinct black streaks.

Genitalia: ♂. Pointed process of tenth tergite long, the ridge at its base only a little lower proximally than distally, with feeble indication of being sinuate; harpe short, pointed, usually denticulate.

Hab. Nicaragua to West Ecuador, eastwards to Trinidad and the Lower Orinoco, Nicaragua specimens leading over to the preceding form; name-type from Muzo, Colombia.

In the Tring Museum 210 ♂♂, 28 ♀♀, from: Azahar de Carthago, Costa Rica, February 1899 (J. Underwood); Carillo, Costa Rica, 3000 ft., October 1904

(A. Hall); Volcan de Miravalles (Underwood); Limon, October 1904 (A. Hall); Bogava, 800 ft., and Boquete, 3500 ft., Chiriqui (Watson); Parida I., Sevilla I., Cebaco I., and Brava I., January 1902 (Batty); R. Dagna, W. Colombia (Roseberg); Pereira, Cauca; Muzo, December 1896; Peperital to Buenavista, January 1897 (Dr. Bürger); Villavicencio to R. Ocoor, January, and Villavicencio to Monte Redondo, March 1897 (Dr. Bürger); Cananche, Cundinamarca, July 1903 (Mathan); Onaca, S. Marta, 2000 ft. (Engelke); Mocotoné and Tachira, Venezuela (Briceño); Cumana, 1300 ft. (André); Trinidad; Caparo valley (Dr. T. Rendall); La Vuelta and Snapure, Canra R., Orinoco, February and May (S. M. Klages); Paramba, N.W. Ecuador, February—June 1897 (Roseberg); Cachabi, January 1897, Chimbo, August 1897 (Roseberg); Rita and R. Cayapas, N.W. Ecuador (Flemming and Miketta); Quevedo (v. Buchwald).

e. P. thoas thoas L. (1771).

Seba, *Thesaur.* iv. p. 46. t. 38. fig. 6. 7. ♂ (1764); Drury, *Illustr. Exot. Ins.* i. p. 44. t. 22. fig. 1. 2. ♂ (1770) (Surinam).

Papilio Eques Achirus thoas Linné, *Mant. Plant.* p. 536 (1771) (*partim*); Drury, *loc. Index* (1772); Fabr., *Syst. Ent.* p. 451. n. 48 (1775) (*partim*); Cramer, *Pap. Exot.* ii. p. 108. t. 167. fig. A. B. (1777) (Surinam); Goeze, *Ent. Beytr.* iii. 1. p. 71. n. 4 (1779) (*partim*); Fabr., *Spec. Ins.* ii. p. 19. n. 76 (1781) (*partim*); id., *Mant. Ins.* ii. p. 10. n. 87 (1787) (*partim*); Jabl. & Herbst, *Naturs. Schmett.* iii. p. 127. n. 90. t. 40. fig. 3. 4 (1788) (Surinam); Gmelin, *Syst. Nat.* i. 5. p. 2240. n. 321 (1790) (*partim*); Jung, *Alphab. Verz. Schm.* p. 236 (1792); Fabr., *Ent. Syst.* iii. 1. p. 32. n. 94 (1793) (*partim*); Esper, *Aust. Schmett.* p. 198. n. 90. t. 49. fig. 1 (1797).

Papilio thoas, Meerburgb, *Afb. Zeldz. Gew.* t. 21 (1775).

Princeps heroicus thoas, Hübner, *Samml. Exot. Schmett.* i. t. 114. fig. 1. 2 (1806—?).

Heraclides thoas, Hübner, *Verz. bek. Schmett.* p. 83. n. 852 (1818 ?); Kirby, in Hübner, *Samml. Exot. Schmett.* ed. ii. p. 96. t. 114. fig. 1. 2 (190—?) (literat. *partim*).

Papilio thoas, Godart, *Enc. Méth.* ix. p. 62. n. 103 (1819) (*partim*); Lacord., *Ann. Soc. Ent. Fr.* ii. p. 383 (1833) (Guyane); Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vii. p. 50. (1838) (*partim*); Wallace, *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Amazons, gardens); Bates, *ibid.* (2). v. p. 347 (1861) (Pará); id., *Journ. Entom.* 1. p. 228. n. 27 (1862); id., *Natural. Riv. Amaz.* p. 52 (1864) (Pará, in street); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 296 (1864) (Surinam; Pará); Möschl, *ibid.* xxvi. p. 296 (1876) (Surinam); Butler, *Trans. Ent. Soc. Lond.* p. 146. n. 231 (1877) (Serpa, April); Sharpe, *Proc. Zool. Soc. Lond.* p. 555. n. 4 (1890) (R. Araguaya); Eimer, *Orthogen. Schmett.* p. 138. fig. 62 (1897) (Surinam).

Papilio thoas var. *thoas*, Oberthür, *Et. d'Ent.* iv. p. 70. sub n. 210 (1880) (Guyane).

♂ ♀. As yellow in tint as the large subspecies *P. thoas cinyras*.—*Upperside*, forewing: apical spot usually small, sometimes a mere dot; spots before upper angle of cell larger than in the other forms, except *cinyras*, there being often a small additional spot within the subcostal fork; discal patch R¹—R² smaller than in the other forms; patch R²—R³ as a rule the same in size as patch R³—M¹, rarely a little longer, the veins R² and backwards more narrowly black between the patches than in *P. thoas nealees* and *P. thoas thoantiades*; patch SC²—R¹ usually without black spot or sinus; four submarginal spots, sometimes three, small; cell-patch rarely absent.

Underside: submarginal spots of forewing comparatively small, especially the upper ones; black discal area of hindwing usually broad and the blue halfmoons pure in colour as a rule, black marginal line wider and submarginal patch SC²—R¹ on the whole less projecting basad than in *P. thoas nealees*.

Hab. The Guianas; Lower Amazons.

In the Tring Museum 12 ♂♂, 6 ♀♀, from: Demerara, Essequibo R., and Berbice R., British Guiana; Surinam.

f. P. thoas cinyras Méuér. (1857).

- Papilio lampelou* Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 54. n. 206 (1856) (Villa Nova; *nom. nudum!*).
- Papilio cinyras* Ménétrés, *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. *Suppl.* p. 68. n. 1124. t. 7. fig. 3. (1857) ("Bahia" error loci); *id.*, *l.c.*, *Descr.* p. 111. n. 1124 (1863); Gerst., *Stett. Ent. Zeit.* xix. p. 302 (1858) ("is aberrat. of *P. thoas*"); Felder, *Wien. Ent. Mon.* iii. p. 393. note (1859) ("distinct from *thoas*"); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 347 (1861) (from Villa Nova upwards); *id.*, *Journ. Entom.* i. p. 228. n. 29 (1862) (Upper Amazons; "interior of province of Bahia" error of local. or of identif.); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 296 (1864) (*partim*; Ega; Villa Nova); Butl., *Ann. Mag. N. H.* (4). xx. p. 127. n. 62 (1877) (R. Mairo, Peru); Hopff., *Stett. Ent. Zeit.* xl. p. 52. n. 19 (1879) (Peru); Oberth., *Et. d'Ent.* iv. p. 70. n. 209 (1880) (Teffé, Obydos); Mil., *Nat. Sci.* v. p. 243 (1886) (Monaco!); Hahnel, *Iris* iii. p. 240 (1890) (Villabella, Amaz.); *id.*, *l.c.* p. 283 (1890) (Pebas).
- Papilio thoas* L. var. *cinyras*, Staudinger, *Exot. Tagf.* p. 16. t. 11. ♂ (1884); Michael, *Iris* vii. p. 213 (1894) (Sao Paulo de Olivença).
- Papilio thoas*, Maassen & Weym., in Stübel, *Reisen S. Amer.*, *Lep.* p. 82. n. 50 (1890) (Upper Amazons); Dognin, *Lép. Loja* p. 37 (1891); Holland, *Bull. Book t.* 42. fig. 4 (1899); Weeks, *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumani).
- Papilio cinyras* (!), Eimer, *Orthogen. Schmett.* p. 137 (1897).

In the south intergrading with the next subspecies.

♂ ♀. *Upperside*, forewing: cell-spot present, sometimes small; spots in front of apex of cell usually large, sometimes minute, patch SC⁵—R¹ entire, sometimes bearing a black spot, seldom deeply sinuate; submarginal spots absent or small, usually present in Bolivian specimens.—*Hindwing*: yellow band broad, upper submarginal spots usually much smaller than the others; red anal crescent absent or (in southern specimens) small, blue halfmoon distinct.

Hab. Eastern Ecuador, Amazons (except delta district), southward to Bolivia.

In the Tring Museum 79 ♂♂, 9 ♀♀, from: Obidos; R. Uaupes, Upper R. Negro; Iquitos (Stuart); R. Cachyaco, affl. of R. Hnallaga (Stuart); R. Napo, E. Ecuador (R. Haensch); Zamora (O. T. Baron); R. Chuchuras, affl. of R. Palcazu, 320 m. (W. Hoffmanns); Chanchamayo (Schnunke); Palcazu (Sedlmayr); Perené R., March 1900 (Simons); R. Mixiollo, Loreto (Baer); R. Toro, Ia Merced, August—September 1901 (Simons); Pozuzo, Huánuco (W. Hoffmanns); La Union, R. Huacamayo, Carabaya, 2000 ft., November and December 1904 (G. Ockenden); Chirimayo, Carabaya, July 1901, 1000 ft. (Ockenden); Oroya, R. Inambari, 3500 ft., November 1901 (Ockenden); Caradoc, Marepata, 4000 ft., February 1901 (Ockenden); R. Slucuri, S.E. Peru, 2500 ft., June 1901 (Ockenden); Salamplioni, Bolivia, September 1900 (Simons); Charuplaya, 1300 m., June 1901 (Simons); R. Songo (Garlepp); Sorata (Guenther); Mapiri; Salinas, R. Beni, July 1895 (Stuart); Prov. Sara, S. Cruz de la Sierra (J. Steinbach).

g. P. thoas brasiliensis subsp. nov.

- Papilio thoas*, Ménétrés, *Mém. Soc. Imp. Moscou* vii. p. 188. n. 3 (1829) (Brazil, larva); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 170 (1846) (Brazil); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 39. n. 196 (1852) (*partim*; Brazil); *id.*, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 54. n. 206 (1856) (*partim*; Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 4. n. 63 (1857) (Brazil); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 295 (1864) (*partim*; Brazil); Prillw., *Stett. Ent. Zeit.* xxvi. p. 129 (1865) (Corcovado); Butl., *Cat. Diurn. Lep. descr. Fabric.* p. 216. n. 44 (1869) (Brazil); Capronn., *Ann. Soc. Ent. Belg.* xvii. p. 9. n. 12 (1874) (*partim*; Botafogo, August; Rio, Entre Rios; very common); Burm., *Descr. Rép. Argent. v. Lép.*, *Atlas* p. 3. t. 2. fig. 1. 2. larva (1879) (Rio de Jan.); Oberth., *Et. d'Ent.* iv. p. 70. n. 210 (1880) (*partim*; Brazil); Jones, *Proc. Lit. Phil. Soc. Liverpool*, p. 41 (1883) (metamorph.); Seitz, *Stett. Ent. Zeit.* li. p. 98 (1890) (Corcovado); Weym., *ibid.* lv. p. 315. n. 14 (1895); Mabilde, *Guia Pract. Borbol. Rio Grande do Sul* p. 49 (1896); Peters, *Illustr. Zeitschr. Ent.* ii. p. 51 (1897) (Nova Friburgo; larva).
- Papilio cresphontes*, Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 294 (1864) (*partim*; Brazil).

♂ ♀. A large form, nearly as bright yellow as *P. thoas einyras*; the female very little paler than the male.—*Upperside*: forewing somewhat falcate; cell-spot absent or small; subapical spot large in nearly all specimens, usually produced into a point; patch SC⁵—R¹ deeply sinuate, sometimes completely divided; submarginal spots always present, usually four.—*Hindwing*: red anal spot present; distal edge of yellow band crossing cell at base of M² or proximally of it; upper submarginal spots usually more or less rotundate.

Underside: subapical spot of forewing large, the third and fourth submarginal spots somewhat transverse, often also the second; black marginal band of both wings broad in the majority of specimens.

Genitalia essentially as in *P. thoas autocles*; ♂, lateral ridge of tenth tergite not toothlike, not subsinuate; harpe somewhat curved, ventrally denticulate before apex.—♀, edge of vaginal orifice proximally raised into a tubercle or an obtuse process.

Hab. Bahia southwards, extending westwards to South-East Bolivia, intergrading completely with the next form, and in S.E. Bolivia with the preceding subspecies, there being neither sharply defined morphological nor geographical limits.—Type of name from Petropolis.

It is probable that *P. thoas* is in these districts a wanderer like the Nearctic *P. cressphontes*, which would explain the absence of a strict line of separation between the Brazilian and Argentinian forms.

The large Brazilian specimens are usually regarded as being the same as the form from Surinam, which is the nomenclatorially typical subspecies of *P. thoas*.

In the Tring Museum 50 ♂♂, 26 ♀♀ and a larva from: Minas Geraës, February 1897 and 1901 (A. Kennedy); Petropolis, December and January (J. Foetterle); S. Paulo; Castro, Parana (E. D. Jones); Yhu, Paragnay, September—December 1896 (Audeer); Sapucay, Paraguay (W. Foster); Patino Cué, Paragnay, February (Montforts), Tucuman (J. Steinbach); Salta (J. Steinbach); S. José de Chiquitos, E. Bolivia, July 22. 1904 (J. Steinbach).

h. P. thoas thoantiades Burm. (1878).

Papilio thoantiades Burmeister, *Descr. Rép. Argent. v. Lép.* p. 59. n. 6 (1878) (var. of *thoas*); id., *l.c.*

Atlas t. 2. fig. 3. larva, 3a. pupa, t. 4. fig. 9. ♀ (1879); Oberth., *Et. d'Ent.* iv. p. 70. n. 210 (1880) (*partim*; Buenos Aires); Gosse, *Entom.* xiii. p. 194 (1880) (Corrientes).

Papilio thoantides (!), Staudinger, *Exot. Tagf.* p. 16 (1884) (Argentina).

♂ ♀. Smaller than the preceding; discal band of fore- and hindwing very variable in width, usually paler than in *P. thoas brasiliensis*; discal and marginal black bands on *underside* of hindwing broad.

Genitalia: ♂, harpe more curved than in *brasiliensis*.

Hab. Province of Buenos Aires and northward.

In the Tring Museum: 30 ♂♂, 20 ♀♀ and some larvae and pupae from: Buenos Aires, January, February and March (Ruscheweyh); Cordoba, Paysandu, and Rosario, March (Ruscheweyh); La Soledad, Entre Rios, February 1899 (Chas. Britton).

67. *Papilio homothoas* spec. nov. (Pl. V., fig. 13).

Papilio cressphontes, Felder (*non* Cramer, 1777, err. det.), *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 294 (1864) (*partim*; Bogota).

Resembling *P. thoas*; forewing shorter; bases of distal segments of antenna of male broadly yellow beneath; tail shorter and more strongly spatulate, being

narrower proximally; no spot in cell of forewing on upperside; patch SC^5-R^1 of forewing entire or with a small sinus only, patch R^2-R^3 projecting beyond the next as in *P. cresphontes*, submarginal spot R^3-M^1 being more proximal than in *P. thoas*; genitalia quite different.

♂. Wings, *upperside*: markings chrome-yellow, deeper in tint than in *P. thoas*.—Forewing: no spot in cell; spots before upper angle of cell as large as in *P. thoas thoas*; a small additional spot at base of subcostal fork; patch SC^5-R^1 entire or with black spot or sinus, patches R^2-SM^2 contiguous, patch R^2-R^3 truncate distally, projecting beyond the next one, its outer edge being in a line with that of the preceding patch; three submarginal spots of almost equal size standing in an oblique row.—Hindwing rather shorter posteriorly than in *P. thoas*; tail more evenly spatulate, broader at apex and narrower proximally than in *P. thoas*.

Underside deeper yellow than in South American *P. thoas*, but not so deep as in *P. thoas oriedo* from Cuba.—Forewing: cell striped with black; submarginal spot R^3-M^1 much larger than the others and extending much more proximad.—Hindwing: cell yellow, except a narrow apical crescent; black discal band narrow, each patch bearing a blue or a yellowish spot; two orange-red spots R^2-M^1 at cell; orange-red anal spot connected with the marginal spot.

♀. Somewhat paler than male, markings of *upperside* smaller, patch SC^5-R^1 of forewing with small black sinus.

Genitalia: ♂. Tenth tergite bifurcate, the lobes projecting laterad, being narrow and pointed; tenth sternite short, on each side with an apically sinuate lobe, the lower one of which is acute and somewhat produced. Harpe a broad concave plate, obtuse at apex, which is a little curved inward; ventral edge parallel to edge of elasper, distally denticulate.—♀. Edge of vaginal orifice slightly elevate all round; from this low ring extends on each side backwards a ridge which borders a large postvaginal depression, the ridge being raised close to the vaginal orifice into a pointed, triangular process; no strongly chitinised ridge or depression proximally of the orifice.

Hab. Ciudad Bolivar, Lower Orinoco, June 1891, 1 ♂, type; Maripa, Caura R., October 1903 (S. M. Klages), 1 ♂; Lower Orinoco, November 1897 (Cherrie), 1 ♀; Colombia, 3 ♂♂.

In coll. Godman from Colombia; in coll. Adams from Marguerita I.; in the British Museum from Venezuela and Bogota.

68. *Papilio cresphontes* Cram. (1777).

Aubert., *Planch. Enum.* t. 69. ♀ (1765) ("Guaeloupe" false).

- Papilio Eques Achirus thoas* Linné, *Mant. Plant.* p. 536 (1771) (*partim*); Fabr., *Syst. Ent.* p. 454. n. 48 (1775) (*partim*); id., *Spec. Ins.* ii. p. 19. n. 76 (1781) (*partim*); id., *Mant. Ins.* ii. p. 10. n. 87 (1787) (*partim*); id., *Ent. Syst.* iii. 1. p. 32. n. 94 (1793) (*partim*).
- Papilio Eques Achirus cresphontes* Cramer, *Pap. Exot.* ii. p. 106. 107. t. 165. fig. A. ♀, t. 166. fig. B. ♂ (1777) (N. York; Carolina—"Jamaica" alia subsp.); Goeze, *Ent. Beytr.* iii. 1. p. 86. n. 64 (1779); Jabl. & Herbst., *Naturs. Schmetz.* iii. p. 121. n. 89. t. 39. fig. 1. 3. ♀, 2. ♂ (1788).
- Papilio Eques Achirus thoas* β) *Papilio cresphontes*, Gmelin, *Syst. Nat.* i. 5. p. 2240. sub n. 321 (1790).
- Papilio cresphontes*, Esper, *Aust. Schmetz.* p. 199. sub n. 90 (1797); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 169 (1846) (*partim*); United Sts., Mexico; Kirtl., *Proc. Ent. Soc. Lund.* (2). i. p. 101 (1851) (south shore of L. Erie; recent arrival; = *thoas*, Boisd. & Lec.); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 39. n. 194 (1852) (*partim*); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 53. n. 204 (1856) (*partim*); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 68. n. 1123 (1857) (Mexico); id., *l.c.*, *Lép. Descr.* p. 111. n. 1123 (1863) (distinct from *thoas*); Reak., *Proc.*

Ent. Soc. Philad. ii. p. 137. n. 5 (1863) (Honduras; syn. excl.); Kirkp., *ibid.* iii. p. 329 (1864) (Cleveland, Ohio, rarely); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 294 (1864) (*partim*); Herr.-Sch., *Corresp. Bl. Zool. Mu. Ver. Regensb.* p. 172. n. 5 (1864) (Cuba); Edw., *Trans. Amer. Ent. Soc.* vi. p. 11. n. 21 (1877) (S. & W. States; occas. in Wisconsin, Michigan, and Ontario); Colem., *Amer. Natural.* p. 688 (1877) (Berlin, Conn., Sept. 6); Gerh., *Macra-Lep. N. Am.* p. 25. n. 438 (1878); Strecker, *Butt. Moths N. Am.* p. 68. n. 7 (1878); Burm., *Descr. Rép. Argent. v. Léop.* p. 58. n. 1 (1878) (var. of *thous*); Bean, *Canad. Ent.* x. p. 35 (1878) (correct. of note in *Amer. Nat.* 1877. p. 688); Saund., *ibid.* p. 48 (1878) (life hist.); Peck, *ibid.* p. 60 (1878) (Fairfield Co., Conn.); Boll, *ibid.* p. 154 (1878) (Dallas, Texas, larva and pupa, on *Zanthoxylum carolinianum*); French, *ibid.* p. 204 (1878) (position of pupa); Saund., *ibid.* p. 223 (1878); French, *Trans. Dept. Agric. Illin.* xv. p. 139 (1878); Saund., *l.c.* xi. p. 203 (1879) (Ontario); Moffat, *ibid.* p. 240 (1879) (Hamilton, Ont.); Murray, *ibid.* p. 240 (1879) (Hamilton); Saund., *Rept. Ent. Soc. Ontario* p. 60. fig. 38 (1879) (distrib.; food-plants); *id.*, *l.c.* p. 41. fig. 19 (1880); French, *Rept. S. Ill. Norm. Univ.* vi. p. 43 (1880); Murray, *Canad. Ent.* xii. p. 120 (1880) (Hamilton); Saund., *ibid.* p. 120 (1880) (larva June, imago July, larva autumn, pupa hibernating); Oberth., *Ft. d'Ent.* iv. p. 70. n. 210 (1880) (*partim*; Texas); Comst., *Rept. Dep. Agric.* p. 246 (1880) (metam.); Moffat, *Rept. Ent. Soc. Ontario* p. 10 (1881) (Long Point and Ridgeway); Saund., *ibid.* p. 41. fig. 19 (1881); Moffat, *Canad. Ent.* xiii. p. 115 (1881) (Hamilton); French, *ibid.* p. 177 (1881) (life history); Gundl., *Contr. Ent. Cuba.* p. 131 (1881); Goodall, *Papilio* ii. p. 188 (1882) (Amherst, Mass., Sept. 5); Bruce, *ibid.* p. 188 (1882) (Monroe Co., N.Y., larva on *Ruta graveolens*); Moffat, *Rept. Ent. Soc. Ontario* p. 30 (1882) (larva in October; Hamilton, Ont.); Reed, *Canad. Ent.* xiv. p. 181 (1882) (London); Jack, *ibid.* p. 219 (1882) (15 miles south of Montreal, August); Saund., *ibid.* xv. p. 204 (1883) (larva on *Zanthoxylum americanum* & *Ptelea trifoliata*); *id.*, *l.c.* p. 234 (1883) (egg, young larva, on *Zanthoxylum fraxinicum*); *id.*, *Ins. Inj. Fruit* p. 377. fig. 389-91 (1883); Edw., *Papilio* iii. p. 26 (1883) (Wis., Northern N.Y., Me., Mass., Conn.); Colem., *ibid.* p. 43 (1883) (Conn.); Dimmock, *Psyche* iv. p. 99 (1883) (Cambridge, Mass., August); Saund., *Canad. Ent.* xvi. p. 50 (1884) (Lake Erie); Edw., *ibid.* p. 109 (1884) (egg); Lintn., *Papilio* iv. p. 136. n. 3 (1884) (Rio Grande); Saund., *Rept. Ent. Soc. Ontario* p. 16 (1884) (larva on *Ptelea* and *Zanthoxylum*); Jack, *ibid.* p. 37 (1884) (Prov. Quebec, end of August); Neal, *Bull. Dept. Agric., Ent.* iv. p. 87 (1884) (larva destr. by ants and *Mutilla*!); Saund., *Rept. Ent. Soc. Ontario* xv. p. 29. 30 (1885) (Point Pelée, L. Erie); Hubb., *Ins. Aff. Ct. Orange* p. 137. fig. 56. t. 10. 11 (1885); Bates, *Canad. Ent.* xviii. p. 80 (1886) (Massachusetts); French, *Bull. East. U.S.A.* p. 103. fig. 20—22 (1886); Mayn., *Bull. N. Engl.* p. 50. n. 69. t. 5. fig. 69. 69A (1886); Shann., *Canad. Ent.* xix. p. 180 (1887) (Indiana; larva on *Populus dilatata*); Geddes, *Rept. Ent. Soc. Ontario* xviii. p. 23. fig. 5 (1888) (Oxford, Ont.); Skinn., *Canad. Ent.* xxi. p. 127 (1889) (Philadelphia, occasionally); Riley, *Insect Life* ii. p. 2 (1889) (larva on orange); Edw., *Bull. U.S. Nat. Mus.* xxxv. p. 12 (1889) (liter. on metam.); Riley, *Insect Life* iii. p. 32 (1890); Dyar, *Psyche* v. p. 421 (1890) (number of moults); Pack., *Fifth Rept. U.S. Ent. Comn.* p. 472, 661 (1890) (egg, various larval stages, pupa; food-plants); Mayn., *Man. N. Amer. Butt.* p. 14. n. 20. fig. 10c (1891); Edw. & Ell., *Bull. Amer. Mus. N. II.* iv. p. 75 (1892) (egg and first three stages of larva); Staley, *Canad. Ent.* xxiv. p. 204 (1892) (Marshall, Missouri, iv.—x., common); Davis, *Journ. N. York Ent. Soc.* i. p. 47 (1893) (Staten I., N.Y., Aug., Sept. 1882); Beutenm., *Bull. Amer. Mus. N. II.* v. p. 245 (1893) (N. York; descr. of l., p., i.; two broods, June and Aug.); Beth., *Canad. Ent.* xxv. p. 260 (1893) (Lake Simcoe, Aug. 28); Holl., *ibid.* p. 311 (1893) (Pittsburgh, larva on *Zanthoxylum* and *Ptelea*, in Florida on orange and lemon); Soule, *Psyche* vi. p. 530 (1893) (Brookline, Mass.); Haase, *Untersuch. Mimicry* i. p. 96 (1893); Moffat, *Canad. Ent.* xxvi. p. 54 (1894) (London, larva in Oct. from being nearly full fed to little ones); *id.*, *l.c.* p. 123 (1894) (London, July and Aug.); Ellis, *ibid.* p. 176 (1894) (Sparrow Lake, 110 miles north of L. Ontario); Davis, *Ent. News* v. p. 109 (1894) (Little Rock, Ark.); White, *ibid.* p. 175 (1894) (Brooklyn); Ehrm., *ibid.* v. p. 212 (1894) (Pittsburgh, Pa.); Weed, *Psyche* vii. p. 130. n. 37 (1894) (N.E. Miss.); Moffat & Saund., *Rept. Ent. Soc. Ontario* xxiv. p. 6 (1894) (London); Beth., *ibid.* (1894) (Lake Simcoe); Holl., *ibid.* p. 53. fig. 26 (1894) (Pittsburgh; larva on *Zanthoxylum* and *Ptelea*); Moffat, *Canad. Ent.* xxvii. p. 147 (1895) (London, June, full-fed larva in July); Denton, *Psyche* vii. p. 263 (1895) (Wellesley, Mass., June 2.); Osburn, *Ent. News* vi. p. 282. n. 45 (1895) (Tennessee, rare, vi. to ix., two broods); Grant, *Canad. Ent.* xxviii. p. 273 (1896) (Orillia, Ont.); Truman, *Ent. News* viii. p. 29 (1897) (Volga, S. Dakota, travel-worm); Beutenm., *Journ. N. York Ent. Soc.* v. p. 101 (1897) (distinct from *thous*); Duzee, *Bull. Buffalo Soc. N. Sc.* v. p. 107. n. 6 (1897) (Buffalo, occasional); Thoms., *Canad. Ent.* xxix. p. 263 (1897) (larva on *Ratonee*, *Zanthoxylum* and *Ptelea*); Rowley, *Ent. News* ix. p. 37 (1898) (Louisiana, Mo., larva on hop tree and prickly

- ash); Britton, *ibid.* p. 173 (1898) (Newhaven, Conn., June 15); Ashm. & Schwarz, *Proc. Ent. Soc. Washingt.* iv. p. 50 (1898) (change of food); Beutenm., *Bull. Amer. Mus. N. H.* x. p. 310 (1898) (Highland Falls, N.Y.); Holland, *Butt. Book* p. 311, n. 8. t. 2. fig. 16, t. 4. fig. 8—10, t. 42. fig. 3 (1899); Beutenm., *Butt. N. York City* p. 6. n. 4. fig. ♂ (1902); Moffat, *Rept. Ent. Soc. Ontario xxxiii.* p. 51 (1902) (Trenton, Ang.; London, Ont.); Evans, *ibid.* p. 82 (1902) (Trenton); Walk., *ibid.* p. 85 (1902) (Point Pelee, Leamington; Walpole I.); Clark, *Ent. News* xiii. p. 27 (1902) (Newtonville, Mass., Sept. 13); Field, *ibid.* xiii. p. 331 (1902) (East Alstead, N.H., June 12); Hoag, *ibid.* xiv. p. 320, 321 (1903) (Altamira & S. Louis Potosi, Mex.); Moffat, *Rept. Ent. Soc. Ontario xxxiii.* p. 58, fig. 36 (1903) (London, Ont.).
- Heracles orilus* Hübner, *Verz. bek. Schmett.* p. 83. n. 850 (1818?) (nom. nov. loco *cresphontes*).
- Papilio thoas* var., Godart, *Enc. Méth.* ix. p. 62. n. 103 (1819) (*partim*); Boisdu, *Spec. Gén. Lép.* i. p. 355. n. 197 (1836) (*partim*); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 17 (1845) (*partim*).
- Papilio thoas*, Boisduval & Leconte, *Hist. Gén. Lép. Amér. Sept.* p. 32. t. 12. fig. 1. ♀, t. 13. fig. 1. ♂, 2. larva, 3. pupa (1833) (Georgia; Florida); Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vii. p. 50 (1838) (*partim*); Doubl., in Westw., *Arcana Ent.* i. p. 144 (1845) (habits); Poey, *Mem. R. Soc. Econ. Habana* p. 234 (1846); Lucas, in Sagra, *Hist. Cuba* vii. p. 206 (1857) (*partim*); Gosse, *Letters from Alabama* p. 170 (1859); Morris, *Syn. Lep. N. Am.* p. 7. n. 10 (1862); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 148 (1863) (*partim*); Reed, *Canad. Ent.* i. p. 19 (1868) (London, Ont.); Butler, *Cat. Diurn. Lep. descr. Fabric.* p. 246. n. 44 (1869) (*partim*); Parker, *Amer. Entom.* ii. p. 175 (1870) (Iowa); Bean, *Ent. Mo. Mag.* x. p. 248 (1874) (Galena, Ill.; quite uncommon, Ang. Sept.); Carey, *Rept. Ent. Soc. Ontario* p. 5 (1875) (Amherstburg); Sand., *ibid.* p. 15 (1876) (Northbridge, Ont.); Cook, *ibid.* (1876) (Lansing); Dent., *Canad. Ent.* ix. p. 160 (1877) (Ontario); Murray, *ibid.* x. p. 120 (1878) (Hamilton, Ont.); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 223. n. 53 (1890) (*partim*); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 273 (1897) (= *cresphontes*); Dyar, *Bull. U.S. Nat. Mus.* lii. p. 3. n. 14 (1902) (Atl. States; Arizona; Mexico; *partim*?); Laur., *Ent. News* xiv. p. 296 (1903) (Miami, Fla., common); Sherm., *Rept. Ent. Soc. Ontario xxxvi.* p. 26, fig. 11 (1905) (N. Carolina).
- Papilio thoas* var. b. *P. cresphontes*, Kirby, *Cat. Diurn. Lep.* p. 541. sub n. 155 (1871) (Univ. Amer.).
- Papilio thoas* var. *cresphontes*, Gundlach, *Papilio* i. p. 113 (1881) (Cuba); Aaron, *Papilio* iv. p. 172 (1884) (S. Texas, common).
- Papilio thoas* (*cresphontes*), Dwight, *Psyche* iii. p. 327 (1882) (Dutchess Co., N.Y.); Bunker, *Canad. Ent.* xv. p. 100 (1883) (N. York, two broods); Perrin, *Rept. Ent. Soc. Ontario xxxiv.* p. 90 (1904) (15 miles from Halifax, Aug. 1901).
- Heracles cresphontes*, Scudder, *Butt. East. U.S.A.* ii. p. 1334. t. 14. fig. 12, t. 27. fig. 2, t. 35. fig. 21-3, t. 41. fig. 4, t. 57. fig. 3, t. 66. fig. 3, t. 68. fig. 19, t. 73. fig. 1, t. 76. fig. 16, t. 79. fig. 62-6, t. 85. fig. 8, 9, 10 (1889) (morphol., metam., etc.;—liter. *partim* ad aliam spec. ref.); Kirby, in Allen's *Nat. Libr., Lep. Butt.* ii. p. 282 (1896); Scudder, *Psyche* viii. p. 210. t. 5. f. 5, 1. juv. (1898); Mayer, *ibid.* p. 299 (1898) (Dry Tortuga); Kirby, in Hübn., *Samml. Exot. Schmett.* ed. ii. p. 96. t. 314. fig. 3, 4 (190—?).
- Papilio chresphontes* (?), Dury, *Cincinnati Soc. Nat. Hist.* i. p. 12 (1878) (Cinc., not common); Babua, *Ent. News* viii. p. 98 (1897) (Cleveland, Ohio; rare).

Specifically distinct from *P. thoas*, with which it occurs together in Central America, Texas, and Cuba. Dr. Holland separated it correctly from *P. thoas*, but unfortunately figured as *thoas* not the northern form of that species, but a South American specimen (doubtless from the Amazons). The difference in pattern between *P. thoas* and *cresphontes* being but slight, many authors have considered the two insects to be one species. However, that opinion is erroneous. The true distinction between the two insects is not on the surface. The sexual organs, as specified below, exhibit a divergency which is quite astonishing, and it is no less surprising that this difference has never been noticed, although one of the most peculiar features of the organs is visible without dissection.

The only constant difference in pattern between *P. cresphontes* and the northern forms of *P. thoas* is the larger size of the spot R²—R³ (the fifth) of the discal row of the forewing. This spot is larger in *cresphontes* than the next spot, the submarginal spot R³—M¹ being consequently more proximal above and below than the submarginal spot R²—R³.

Individually variable. The patch SC^5-R^1 on the upperside of the forewing is usually excised, seldom completely divided, the black sinus being often reduced to a spot, which is sometimes altogether absent, as is always the case on the underside. Some specimens have a complete row of submarginal spots. One of the most interesting variations is represented by specimens in which there is a second yellow spot before the subcostal fork standing at the proximal side of the subapical spot, this additional spot proving the subapical spot to belong to the submarginal series, not to the discal band. The size of the discal patches is very variable, spots R^3-M^2 being more or less pointed distally. There is apparently never a yellow spot in the cell, as is so often the case in *P. thoas*.—The width of the yellow antemedian band of the hindwing is variable.

On the *underside* considerable variability obtains in the amount of black on both wings and in the size and number of the orange spots on the hindwing; these spots are occasionally of a rufous tawny tint.

There is apparently no marked variation according to season and locality. The few Cuban males which we have examined show, however, a more or less distinct orange-red spot in the cell of the hindwing below, which spot is hardly ever indicated in continental specimens; our Cuban females do not possess the spot.

The specimens from the southern Atlantic States are on the whole the largest, the Central American ones being, on the contrary, of inferior size.

The distribution is somewhat fluctuating, the occurrence in the northern districts of the range not being regular. We suspect the species to be a wanderer also in the southern districts.

P. cresphontes was originally doubtless a northern form of *P. thoas*. The ranges now overlap to a considerable extent, the insects having become so different that they are independent of one another and can exist in the same locality without fusion (compare definition of "species" in *Nov. Zool.* 1896, p. 438, and 1903 *Suppl.* p. xli; also Poulton, *Pres. Address, Ent. Soc. Lond.* 1903).

Genitalia: ♂. Tenth tergite with a very short process instead of the long spatulate process of *P. thoas*, there being in consequence an open space dorsally between the claspers; the process of *cresphontes* can be felt by gently moving the finger over the upper edge of the claspers from behind; the tenth sternite, which in *thoas* bears on each side a long curved pointed process which is proximally dilated into a hairy ridge, has in *cresphontes* a long proximal process which is somewhat irregular at the edges, being narrowed to a point; from beneath this process, *i.e.* standing distally of it, projects an acute and somewhat curved thornlike process. Clasper shorter and much more rounded than in *P. thoas*: harpe broad, hollowed out, narrowest at apex, which is rounded, the apical and ventral edges being minutely denticulate, no apical process as in *P. thoas*.—♀. Edge of vaginal orifice anteriorly raised into a small, smooth tubercle, and posteriorly into a transverse ridge; from this ridge extends on each side backwards a longitudinal ridge bordering a large mesial depression; just in front of the orifice a fold which is laterally raised into a small triangular lobe. Anal segment on inner surface with three bristles on each side.

Early stages similar to those of *P. thoas*.

Hab. Canada to Costa Rica; Cuba.

In the Tring Museum 66 ♂♂, 54 ♀♀ and some larvae and pupae from: Buffalo; Evanston, and St. Augustine, Illinois (Snyder); Nashville, Tennessee (W. Osburn); Iowa; Jefferson Co., Kentucky (Troxler); Louisiana; Florida; Cuba;

Houston, Texas ; Orizaba and Huatuxco, Vera Cruz ; Espinal, Vera Cruz, July 1896 (W. Schaus) ; Guadalajara, September—October (Dr. Butler) ; Guadalajara, July 1896 (W. Schaus) ; Hermosillo, Sonora, March 1903 (Oslar) ; Guerrero (O. T. Baron) ; S. Pedro Sula, Honduras ; Carillo, Costa Rica, 3000 ft., October 1904 (A. Hall) ; Azahar de Cartago, Costa Rica, February 1899 (Underwood).

69. *Papilio paeon* Boisd. (1836).

Papillon péon Roger, *Bull. Soc. Linn. Bordeaux* i. p. 161 (1826) (Chili).

Papilio paeon Boisduval, *Spec. Gén. Léop.* i. p. 356. n. 198 (1836) (Chili) ; Walk., *Ent. Mo. Mag.* xix. p. 53 (1882) (Callao ; larva and pupa).

♂ ♀. Sexes similar, the female being larger and paler than the male. Forewing resembling that of *P. thoas*. Hindwing, *below*, with a row of rufous red spots around cell ; apex of cell bearing a rufous red spot bordered distally by a black crescent, which is often double, the interspace between the two black lines and the tip of cell being buffish-yellow ; tail without yellow spot in centre ; marginal spot behind tail large.

Neuration : SC^3 of forewing strongly curved at base, stalk of $SC^{1,5}$ shorter than the two cross-veins D^2 and D^3 together, D^3 very oblique, sometimes almost in the same direction as D^1 , lower angle of cell very obtuse.

Genitalia : ♂. Tenth tergite long, narrowing apicad, apex rounded ; sternite laterally incrassate in middle, the incrassation divided transversely into an anterior and a posterior toothlike ridge. Clasper rounded ; harpe broad, rounded distally, bearing several long thornlike teeth at the edge.—♀. Edge of vaginal orifice anteriorly in middle raised into a tubercle which is carinate on the anterior and convex on the posterior side ; behind the orifice a rounded tubercle which is densely covered with minute hairs ; behind this tubercle two folds extending forward into the orifice ; in front of the orifice on each side a broad shell-like ridge, with irregular edge, and laterally of this another smaller ridge ; on the posterior surface of the large ridge stands laterally of the orifice a long, slender, pointed, thornlike process. Anal segment on inner surface with four bristles on each side (this number constant ?).

Early stages described by Walker, *l.c.*

Hab. Colombia and Northern Venezuela southward to Bolivia.

There is no reliable evidence that the species occurs in Chili.

Two subspecies :

a. P. paeon thrason Feld. (1865).

Papilio paeon, Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 39. n. 197 (1852) (*partim* ; Bogota) ; *id.* *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 54. n. 207 (1856) (*partim*) ; Vollenh., *Tijdschr. Ent.* iii. p. 86. n. 140 (1860) (Bogota) ; Oberth., *Et. d'Ent.* iv. p. 70. n. 208 (1880) (*partim* ; Muza ; Carare ; R. Magdalena).

Papilio thrason Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 309. n. 292 (1864) (*nom. nud.* ; Bogota ; Venezuela) ; *id.*, *Reise Novara, Lep.* p. 74. n. 57 (1865) (Venezuela ; Bogota) ; Hahnel, *Iris* iii. p. 201 (1890) (Valera, Venez.) ; Godm. and Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 224. n. 54 (1890) (Costa Rica) ; *id.*, in Whymper, *Andes of Equator, App.* p. 109. n. 96 (1891) (Nauegal).

Papilio paeon var. *a. P. thrason*, Kirby, *Cat. Diorn. Lep.* p. 542. sub n. 157 (1871) (New Granada).

Papilio paeon var. *thrason*, Maass & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 14. n. 14 (1890) (Honda to Bogota) ; *id.*, *l.c.* p. 38. n. 33 (1890) (Popayan).

♂ ♀. *Upperside* : submarginal spots of forewing usually linear, thin.—Hindwing rather longer posteriorly than in the following form ; yellow marginal

spot behind tail reaching to three-fourths of tail.—Orange-red markings on *underside* of hindwing smaller than in *P. p. paeon*; the two black crescents M¹—M² more widely separated; black marginal line not so broad, not so strongly arched between the veins, and not interrupted before tail; the latter longer.—Harpe usually with fewer teeth.

Hab. Colombia and Northern Venezuela; Costa Rica (von Patten).

As the specimens in von Patten's Costa Rica collection were not all from Costa Rica, it is possible that also the present insect got into the collection by some mistake.

In the Tring Museum 28 ♂♂, 6 ♀♀, from: R. Dagna, W. Colombia (Rosenberg); "Bogota"; Pereira, Cauca; Mérida, Venezuela (Briceño).

b. P. paeon paeon Boisdl. (1836).

Papilio paeon Boisduval, *l.c.*; Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 172 (1846) (Chili); Blanch., in Gay, *Hist. Fis. Chile*, Zool. vii. p. 8. n. 2 (1852) (Chile?); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 39. n. 197 (1852) (*partim*; "Chili"); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 54. n. 207 (1856) (*partim*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 309. n. 291 (1864) (Peru; Chile?); Kirby, *Cat. Diurn. Lep.* p. 542. n. 157 (1871) (var. excl.; "Chili"; Peru); Burm., *Descr. Rép. Argent. v. Léop.* p. 58. n. 4 (1878) (var. of *thous*!); Hopff., *Stett. Ent. Zeit.* xl. p. 49. n. 4 (1879) (Peru); Oberth., *Et. d'Ent.* iv. p. 70. n. 208 (1880) (*partim*; Peru); Walker, *Ent. Mo. Mag.* xix. p. 53 (1882) (Callao; larva on parsnip, descript. of various stages and pupa); Bartl.-Calv., *Cat. Lep. Chile* p. 5. n. 2 (1886) (doubtful as Chilian).

Papilio peon, Standinger, *Exot. Tagf.* p. 16 (1884); Maass. & Weym., *l.c.* p. 72. n. 7 (1890) (Tambo de Chillo, 3000—3600 m.); Dognin, *Lép. Loja* p. 15 (1887); id., *l.c.* p. 37 (1891).

Papilio thrasom, Weeks (*non* Felder, 1865, *err. det.*), *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumani).

♂♀. Yellow marginal spot behind tail extending about half-way to apex of tail. Submarginal spots of *underside* of forewing more or less rounded, small; black marginal line of hindwing broad, strongly arched between the veins; orange-red spots large.—Harpe usually with four teeth or more.

Hab. Ecuador to Bolivia; the locality "Chile" of the older writers doubtless erroneous.

In the Tring Museum 25 ♂♂, 3 ♀♀, from: Chimbo, N.W. Ecuador, July 1897, 2000 ft. (Rosenberg); Ibarra, May 1897 (Rosenberg); Ambato; Zamora (O. T. Baron); Chosica, Peru, 850 m., January 1900 (Simons); Huancabamba, Cerro de Pasco (E. Boettger); R. Mixiollo, Loreto (Baer); Chanchamayo (Schunke); Carobas, Peru, 2500 ft., December 1899 (Simons); La Merced, Chanchamayo 1000 m., April 1900 (Simons); Chulumani, Bolivia, 2000 m., January 1901 (Simons); R. Tanampaya (Garlepp); Yungas de La Paz (Garlepp); R. Unduawe, Bolivia, 2000 m., February 1901 (Simons).

70. *Papilio caiguanabus* Poey (1851).

Papillon perithous Roger, *Bull. Soc. Linn. Bordeaux* i. p. 159 (1826) (Cuba).

Papilio caiguanabus Poey, *Mem. Hist. Nat. Cuba* i. p. 442. t. 15. fig. 1. 2. ♀, 3. 4. ♂ (1851); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 38. n. 186 (1852) (Cuba); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 52. n. 194 (1856) (Cuba); Lucas, in Sagra, *Hist. Cuba* vii. p. 207 (1857); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 146 (1863) ("West Indies"); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 309. n. 286 (1864) (Cuba; = *numicus*); Herr.-Sch., *Corresp. Bl. Zool. Min. Ver. Regensb.* p. 173. n. 8 (1864) (Cuba); Kirby, *Cat. Diurn. Lep.* p. 542. n. 162 (1871) (Cuba); Oberth., *Et. d'Ent.* iv. p. 69. n. 202 (1880) (Cuba); Gundl., *Contr. Ent. Cuba* p. 127 (1881); id., *Papilio* i. p. 113. n. 162 (1881) (Cuba); Haase, *Untersuch. Mimicry* i. p. 98 (1893) (Cuba; "near relative of *P. erostratus*" false).

Papilio numicus Hopffer, *Neue Schmett.* p. 1. n. 2. t. 1. fig. 3. 4 (1856) (Cuba); Hew., *Exot. Butt.* iii. *Pap.* t. 6. fig. 17 (1864).

Roger's nomenclature being French, not Latin, his name cannot be accepted for this species. Boisduval (1836) erroneously applied the name "*pirithous* Roger" to the female of a very different insect (*P. lycophron*).

♂ ♀. Nearest to *P. thoas* and *aristor*; the discal markings of the *upper side* have nearly all disappeared, while the submarginal ones are large, the latter being opalescent white on the hindwing of the female. On the *underside* of the hindwing there are two red spots at cell as in *P. thoas*, and a row of blue discal spots as in *P. aristodemus* and *thoas*.

Genitalia: ♂. Tenth tergite long, narrowing apicad, slightly constricted just before apex; sternite armed at each side with a large, pointed, dentate process; harpe short, broad, rounded, ending in a short point.—♀. Anterior edge of vaginal orifice raised into a smooth tubercle; laterally of the orifice a large depression, the lateral edge of which is elevated, standing posteriorly in connection with the postvaginal ridges; behind the orifice a quadrangular groove with elevated edges, laterally of this strongly chitinised groove a ridge which ends anteriorly near the hinder edge of the orifice in a truncate denticulate process.

Early stages not known.

Hab. Cuba.

In the Tring Museum 7 ♂♂, 7 ♀♀, from: Gibara and Holquin (Tollin).

71. *Papilio aristor* Godt. (1819) (Pl. V., fig. 21).

Papilio aristor Godart, *Enc. Méth.* ix. p. 60. n. 95 (1819) (hab. ?); Boisduval, *Spec. Gén. Léop.* i. p. 51. n. 192 (1836) (type-specimen with three wings in Mus. Paris); Doubl., West. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 160 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 37. n. 183 (1852); id., *Lisi Lep. Ins. Brit. Mus.* i. *Pap.* p. 51. n. 192 (1856); Felder, *Verh. Zool. Bot. Ges. Wien*, xiv. p. 315. n. 360 (1864); Kirby, *Cat. Diurn. Lep.* p. 566. n. 324 (1871) ("Mexico? Antilles?").

The type-specimen of this species appears to have been destroyed. According to Boisduval, *loc. cit.*, the specimen existed in the Paris Museum when he wrote the *Species Général*, but it is no longer in that collection—at least we have not found it there. The only specimen known to us is in the magnificent collection of Mous. Charles Oberthür, who kindly lent it to us for figuring.

♂. Abdomen black, with a subdorsal and a subventral row of buff-yellow spots, the claspers and the eighth segment being more extended yellow.

Underside of wings similar to *upper*, spots paler, anterior discal ones of forewing and submarginal ones of hindwing larger; forewing with buff subapical cell-patch, which does not extend across the cell; hindwing: the discal spots C—R¹ yellowish, vestigial in the specimen, the first indicated also on *upper side*, traces of two orange-red spots R²—M¹ at cell, which were apparently more distinct in Godart's specimens; a row of small blue spots proximally of the submarginal spots.

Neuration: cell of forewing as in *P. caiguanabus*, asymmetrical, the lower angle being very obtuse.

Genitalia: ♂. Tenth tergite long, curved downwards at apex, spatulate; sternite at each side with a long, pointed tooth bearing proximally a rounded hairy projection; harpe broad, excavated, suddenly narrowed to a point, dentate distally at ventral edge.

Female and early stages not known.

Hab. Port-au-Prince, Haiti (F. Odile Joseph), 1 ♂ in coll. Oberthür.

72. *Papilio aristodemus* Esp. (1794).

- Papilio Eques Achivus aristodemus* Esper, *Magaz. Neuest. Ausl. Ins.* p. 8. t. 2 (1794); id., *Ausl. Schmett.* p. 240. n. 113. t. 59. fig. 2 (1798) ("Cuba" false).
Papilio aristodemus, Boisduval, *Spec. Gén. Léop.* i. p. 357. n. 199 (1836); Vollenh., *Tijdschr. Ent.* iii. p. 86. n. 141 (1860) (Antilles).
Papilio daphnis Gray (ex Martyn, *Psyche*, errore), *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 39. n. 198 (1852) (*partim*); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 54. n. 209 (1856) (*synon. partim*; S. Domingo); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863) (West Indies, *partim*; "Mexico" false).
Papilio cresphontinus Martyn, *Psyche* (ined.), t. 3. fig. 8, t. 4. fig. 10. (1797); Kirby, *Cat. Diurn. Lep.* p. 542. n. 158 (1871); Burm., *Descr. Rép. Argent. v. Léop.* p. 58. n. 2 (1878) (var. of *thoas*!); Gundl., *Contr. Ent. Cuba.* p. 130 (1881) (Cuba; S. Domingo; Porto Rico; "Mexico" false).

♂ ♀. Antenna yellow at base of club in most specimens.

Underside of both wings more extended yellow than in *P. thoas*; cell of forewing not striped with black; cell of hindwing either all yellow or bearing a small black spot at apex; yellow submarginal spots of both wings merged together to a band which is anteriorly on forewing not separated from the basidiscal area; black discal band of hindwing narrow, bearing a row of large blue spots, and being bordered proximally by dirty rufous red scaling, which is sometimes absent or vestigial. Tail black on upperside, edged behind with yellow from base to near apex, beneath more or less yellow in middle.

Genitalia: ♂. Tenth tergite spatulate; sternite with small, obtuse, double ridge at the sides; harpe long, acuminate, nearly straight, flat, denticulate at apex, armed with a very long, thornlike process ventrally before the middle, homologous to the process of *P. lycophron*.—♀. Armature of the same type as in *P. lycophron*; edge of orifice anteriorly raised into a compressed tubercle which extends into the orifice, lateral edge elevate, thin, abruptly ending posteriorly; behind orifice a membranaceous tubercle densely covered with minute hairs; laterally of the orifice a large lobe bearing numerous long, thornlike teeth at the edge, and further laterad a small chitinised depression, the free external edge of which is rounded.

Early stages not known.

Hab. Cuba; Haiti.

Two subspecies.

The species connects *P. thoas* with *P. lycophron* and allies.

a. *P. aristodemus temenes* Godt. (1819).

- Papilio temenes* Godart, *Enc. Méth.* ix. p. 63. n. 104 (1819) ("Antilles and North America"); Oberth., *Bull. Soc. Ent. France* p. 176. fig. 4 (1897).
Papilio temenes (!), Lacordaire, *Ann. Soc. Ent. Fr.* ii. p. 384 (1833).
Papilio aristodemus, Boisduval, *l.c.* (1836) (= *temenes*); Poey, *Mem. R. Soc. Eeon. Habana* p. 235 (1846); Lucas, in Sagra, *List. Cuba* vii. p. 206. t. 16. fig. 2. 2a (1857) (*partim*; Cuba); Herr.-Sch., *Corresp. Bl. Zool. Min. Ver. Regensb.* p. 174. n. 12 (1864) (Cuba).
Papilio daphnis Gray, *l.c.* (*partim*); Felder, *l.c.* xiv. p. 309. n. 290 (1864) (*partim*; Cuba).
Papilio cresphontinus, Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 173 (1846) (= *temenes*); Kirby, *Cat. Diurn. Lep.* p. 542. n. 158 (1871) (*partim*); Gundl., *Contr. Ent. Cuba.* p. 130 (1881) (*partim*; Cuba); id., *Papilio* i. p. 113 (1881) (Cuba).

This form has always been treated as being identical with the Haiti form until Mons. Charles Oberthür, *l.c.*, pointed out the differences.

♂ ♀. Forewing: discal band broad, of nearly even width from R² to hind-

margin, about as broad as the cell is wide at M^2 ; a row of five to seven submarginal spots.

Hab. Cuba.

In the Tring Museum 1 ♂, 2 ♀♀, from : Gibara (Tollin); Cuba (Gnndlach).

b. P. aristodemus aristodemus Esp. (1794).

Papilio Eques Achirus aristodemus Esper, *l.c.*

Papilio aristodemus, Boisduval, *l.c.* (*partim*): Doubl., *List Lep. Ins. Brit. Mus. i. Append.* p. 4 (1848) (Haiti?); Dewitz, *Stett. Ent. Zeit.* xxxviii. p. 234. n. 2 (1877) (Porto Rico, common, Aug. Sept.); Oberth., *Et. d'Ent.* iv. p. 70. n. 207 (1880) (Haiti).

Papilio daphnis, Gray, *ll.c.* (*partim*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 309. n. 290 (1864) (*partim*; Haiti).

Papilio cresphontias, Martyn, *l.c.* (*inedit.*); Kirby, *Cat. Diurn. Lep.* p. 542. n. 158 (1871) (*partim*); Möschl., *Abh. Senckenb. Nat. Ges.* xvi. p. 91. n. 2 (1886) (= *aristodemus*; Porto Rico; common); Gndl., *An. Hist. Nat. Madrid* xx. p. 114. n. 2 (1891) (Porto Rico).

♂♀. Band of forewing much narrower than in the previous subspecies, interrupted at the veins; a row of four submarginal spots, the row much more curved than in *temenes*, spots R^2 —(SM^1) standing farther away from the edge of the wing than in the Cuban form.

Hab. Haiti.

In the Tring Museum 5 ♂♂, 1 ♀ from Haiti.

73. *Papilio andraemon* Hübn. (1818—?).

Heracles andraemon Hübn., *Samml. Exot. Schmett.* ii. t. 98. ♂, 99. ♀ (1818—?).

Papilio andraemon, Boisduval, *Spec. Gén. Lép.* i. p. 343. n. 183 (1836) (Cuba); Doubl., *List Lep. Ins. Brit. Mus. i.* p. 16 (1845) ("Honduras" error loci); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 24. n. 108 (1852) ("Honduras" false); id., *List Lep. Ins. Brit. Mus. i. Pap.* p. 32. n. 115 (1856) ("Honduras" false); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 146 (1863) ("West Indies," "Centr. Amer."); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 243 (1893) (occurrence in Mexico and Honduras requires confirmation).

♂♀. Club of antenna for the greater part yellow beneath in male, also in female partly yellow or at least tawny. On *upperside* of wings a nearly straight yellow band from apex of forewing to abdominal margin of hindwing, the cross-veins of the hindwing being within the band; a bar across cell of forewing at point of origin of R^3 and a short band from base of subcostal fork to costal margin also yellow, contiguous with the discal band.—Hindwing very strongly toothed, tooth M^1 long; tail spatulate, bearing a yellow central spot near apex.

Underside of hindwing washed with yellow from base to yellow discal band, this band deeply crenate distally, being followed by a broad black band bearing a row of blue spots; a large tawny patch R^3 — M^1 proximally of the black band often preceded and followed by a small tawny spot.

Genitalia: ♂. Tenth tergite narrow, spatulate; sternite feebly chitinised, without distinct lateral process, bearing only an obtuse double ridge; harpe broad, somewhat scythe-shaped, denticulate distally, produced ventrally into a long acute conical process directed downwards and inclining a little basad.—♀. Edge of vaginal orifice raised into a transverse rounded lobe; behind the orifice a small rounded tubercle covered with extremely small hairs; at each side a very large non-dentate lobe which is anteriorly connected with the vaginal lobe by means of a low folded ridge.

Early stages described by Gnndlach, *l.c.*: see *P. a. andraemon*.

Hab. Cuba; Bahamas; Great Cayman.

Three subspecies.

a. *P. andraemon andraemon* Hübn. (1818 ?—).

Heracles andraemon Hübner, *l.c.*; Kirby, in Hübn., *Samml. Exot. Schmett.*, ed. ii. p. 96. t. 311. fig. 1. 2. t. 312. fig. 3. 4 (190—?) (Cuba; "Mexico, Guatemala," false).

Papilio andraemon, Boisduval, *l.c.*; Poey, *Mem. R. Soc. Econ. Habana* p. 235 (1846); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 13. n. 87 (1846) (Cuba; "Honduras" false); Lucas, in Sagra, *Hist. Cuba* vii. p. 203 (1857); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 68. n. 1115 (1857) ("Honduras" false); Vollenh., *Tijdschr. Ent.* iii. p. 85. n. 132 (1860) (Cuba); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 309. n. 287 (1864) (Cuba; "Mexico and Honduras" false); Herr.-Sch., *Corresp. Bl. Zool. Min. Ver. Regensb.* p. 172. n. 1 (1864) (Cuba); Kirby, *Cat. Diurn. Lep.* p. 542. n. 161 (1871) (Cuba; "Mexico" false); Oberth., *Et. d'Ent.* iv. p. 69. n. 205 (1881) (Cuba); Gündl., *Contr. Ent. Cuba* p. 128 (1881) (larva and pupa descr.); id., *Papilio* i. p. 113 (1881) (Cuba); Haase, *Unters. Mimicry* i. p. 95 (1893) (Cuba; "Mexico and Honduras" false)

♂♀. Forewing without submarginal spots, or the last one or two vestigial; yellow discal band as broad (or nearly) as the black marginal area.

Hab. Cuba.

In the Tring Museum 14 ♂♂, 9 ♀♀, from: Holquin (Tollin); Cuba (Gundlach).

b. *P. andraemon bonhottei* Sharpe.

Papilio bonhottei Sharpe, *Proc. Zool. Soc. Lond.* p. 201. t. 19. ♂♀ (1900) (Nassau).

♂♀. Yellow markings paler than in the previous; discal band much narrower; forewing with a variable number of thin submarginal spots on upperside.

Hab. Bahamas: Nassau.

In the Tring Museum 5 ♂♂, 3 ♀♀ from Nassau.

c. *P. andraemon tailori* subsp. nov.

♂♀. Discal band as broad as in the Cuban form; bar across cell of forewing vestigial above, while it is wider below than in the Cuban form; black antemedian band of underside of forewing more curved, and black discal patches of hindwing smaller than in *P. a. andraemon*.

Genitalia: ♂. Harpe much narrower than in Cuban specimens.

Hab. Great Cayman Island.

One pair in the Tring Museum, collected in April 1896 by Mr. Taylor.

74. *Papilio machaonides* Esp. (1796).

Papilio Eques Achirus machaonides Esper, *Ausl. Schmett.* p. 191. n. 86. t. 46. fig. 2 (1796) (Port au Prince).

Papilio lycoraeus Godart, *Enc. Méth.* ix. p. 63. n. 105 (1819) (America); Ménétr., *Nouv. Mém. Soc. Imp. Moscou* iii. p. 116. n. 2. (1832) (Haiti).

Papilio lycoraeus (?), Lucas, *Lép. Exot.* p. 34. t. 18. fig. 1. (1835).

Papilio machaonides, Boisduval, *Spec. Gén. Lép.* i. p. 344. n. 184 (1836) (Haiti = *lycoraeus*); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 13. n. 86 (1846) (Haiti); Doubl., *List Lep. Ins. Brit. Mus.* i. *Append.* p. 4 (1848) (Haiti); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 24. n. 107 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 31. n. 114 (1856) (Haiti); Lucas, in Sagra, *Hist. Cuba* vii. p. 206 (1857) ("Habana" false); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 2. n. 29 (1857) (Haiti); Vollenh., *Tijdschr. Ent.* iii. p. 85. n. 134 (1860) (Haiti); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863) ("West Indies"); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 309. n. 289 (1864) (S. Domingo; "Cuba" false); Kirby, *Cat. Diurn. Lep.* p. 542. n. 159 (1871) ("Antilles"); Oberth., *Et. d'Ent.* iv. p. 70. n. 206 (1880) (Haiti); Haase, *Untersu h. Mimicry* i. p. 94 (1893).

♂♀. An interrupted discal band on forewing; the posterior portion of the band continuous with a broad cell-bar; upper portion of band extending from costal margin to R²; a complete series of submarginal spots, the first spot

corresponding to the first spot of the so-called discal band of *P. thoas* and *P. andracmon*.

Underside of hindwing yellow from base to middle of disc; no tawny or red spots at apex of cell.

Genitalia: ♂. Tenth tergite narrow, long, spatulate; sternite feebly chitinised, with a small double ridge on each side; harpe narrow, ending in a long point, angulate dorsally before middle, bearing a few teeth at the edge distally of this angle, there being also a small tooth at the ventral edge near base.—♀. Anterior edge of vaginal orifice raised into a longitudinal tubercle accompanied on each side by a fold; these folds diverging laterad, each bearing on the inner side a long, narrow process armed with a few small thorulike teeth; behind the orifice a glossy, rounded tubercle clothed with extremely small hairs.

Early stages not known.

Hab. Haiti.

So far this fine species has not been found on the other West Indian islands, where it appears to be replaced by *P. andracmon*, which does not occur on Haiti.

In the Tring Museum 4 ♂♂, 2 ♀♀, from Haiti.

75. *Papilio thersites* Fabr. (1775).

- ♂. *Papilio Eques Achirus thersites* Fabricius, *Syst. Ent.* p. 453. n. 43 (1775) (America; mus. Hunter); Goetze, *Ent. Beytr.* iii. 1. p. 73. n. 9 (1779); Fabr., *Spec. Ins.* ii. p. 18. n. 68 (1781); id., *Mant. Ins.* ii. p. 9. n. 78 (1787); Gmelin, *Syst. Nat.* i. 5. p. 2238. n. 313 (1790); Fabr., *Ent. Syst.* iii. 1. p. 30. n. 88 (1793).
- ♀. *Papilio Eques palamedes* Fabricius (*non* Drury, 1770), *Syst. Ent.* p. 454. n. 45 (1775) (America; mus. Hunter); Goetze, *Ent. Beytr.* iii. 1. p. 73. n. 11 (1779) (*partim*); Fabr., *Spec. Ins.* ii. p. 18. n. 73 (1781); id., *Mant. Ins.* ii. p. 10. n. 84 (1787); Jabl. & Herbst, *Naturs. Schmett.* iii. p. 141. sub n. 94 (1788); Gmelin, *Syst. Nat.* i. 5. p. 2239. n. 320 (1790).
- ♀. *Papilio Eques Trujanus acamas* Fabricius, *Ent. Syst.* iii. 1. p. 8. n. 22 (1793) (Jamaica; Drury).
- ♀. *Papilio Nymphalis palamedes* id., *Ent. Syst.* iii. 1. p. 68. n. 213 (1793).
- ♀. *Papilio acamas*, Godart, *Enc. Méth.* ix. p. 42. n. 50 (1819); Donovan, *Nat. Repos., Ent.* ii. t. 18 (1823); Boisd., *Spec. Gén. Lép.* i. p. 360. n. 203 (1836) (Jamaica); Doubl., *List Lep. Ins. Brit. Mus.* i. 2. p. 17 (1845) (Jamaica?); id., Westw. & Hew., *l.c.* p. 17. n. 176 (1846) (Jamaica).
- ♀. *Papilio palamedes*, Godart, *l.c. Suppl.* p. 812. n. 133-4 (1824); Boisd., *l.c.* p. 359. n. 202 (1836) (= *pirithous*?); Doubl., Westw. & Hew., *l.c.* p. 21 (1847); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 72 (1852) (doubtful species); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 85 (1856).
- ♂. *Papilio thersites*, Donovan, *Nat. Repos., Ent.* ii. t. 24 (1823); Boisd., *l.c.* p. 353. n. 195 (1836); Doubl., Westw. & Hew., *l.c.* p. 17. n. 166 (1846); Doubl., *List Lep. Ins. Brit. Mus.* i. *Append.* p. 4 (1848) (Jamaica).
- ♂♀. *Papilio thersites*, Hewitson, *Trans. Ent. Soc. Lond.* (2). i. p. 97 (1851) (♂ of *acamas*); Doubl., Westw. & Hew., *l.c.* ii. p. 529 (1852); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 38. n. 191 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 52. n. 200 (1856) (Jamaica); Lucas, in Sagra, *Hist. Cuba* vii. p. 205 (1857) (Jamaica; "Cuba" false); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 148 (1863) ("West Indies"); Kirby, *Cat. Diurn. Lep.* p. 539. n. 149 (1871) ("Antilles"); Butl., *Proc. Zool. Soc. Lond.* p. 481. n. 38 (1879) (Jamaica); Oberth., *Et. d'Ent.* iv. p. 71. n. 213 (1880) (Jamaica); Haase, *Untersuch. Mimicry* i. p. 97 (1893) ("Antilles"); Towns., *Journ. Inst. Jamaica* i. p. 376 (1893) (larva); Fox & Johns., *Ent. News* iv. p. 3 (1893) (Jamaica); Robins., *ibid.* xiv. p. 20 (1903) (Jamaica).
- ♂♀. *Papilio acamas*, Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 311. n. 310 (1864) (*partim*; Jamaica); Butl., *Cat. Diurn. Lep. descr. Fabric.* p. 246. n. 45 (1869) (types of *palamedes* Fabr. *non* Drury, and *thersites* in the Hunterian coll. at Glasgow).

♂♀. Close to *P. lycophron*. The male is easily recognised by the great width of the yellow band of the forewing, the prolongation of the cell-patch halfway down to base and the absence of submarginal spots from the upperside of the forewing. In the female there is a curved yellow band on the forewing; the submarginal

spots of the hindwing are large on the underside, being usually merged together with the marginal spots.

Genitalia: similar to those of *P. lycophron*. Rasplike ridge of harpe raised, forming a narrow process which is rounded at the apex.

The caterpillar closely resembles that of *P. androgeus*.

Hab. Jamaica.

In the Tring Museum 8 ♂♂, 2 ♀♀ and 1 larva.

76. *Papilio ornythion* Boisduval (1836).

♂. *Papilio ornythion* Boisduval, *Spec. Gén. Léop.* i. p. 354. n. 197 (1836) (Yucatan); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 171 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 39. n. 195 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 54. n. 205 (1856); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 293 (1864); Kirby, *Cat. Diurn. Lep.* p. 541. n. 156 (1871); Burm., *Descr. Rép. Argent. v. Léop.* p. 58. n. 3 (1878) (var. of *thoas*); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 227. n. 57. t. 69. fig. 7. 8. ♂ (1890) (fig. of type); iid., *l.c.* p. 729 (1901) (Coatepec; Guatemala).

♂. Close to *P. lycophron pallas*. Yellow band narrow, no spot in cell of forewing; on *underside* of forewing an additional row of linear spots between the discal band and the submarginal spots; blue spots on *underside* of hindwing large.

♀. Yellow markings of *upperside* vestigial.—*Underside*, forewing: a row of submarginal spots; ill-defined streaks between costal margin and R^2 , from which two postdiscal spots SC^3 — SC^5 are separated; a series of minute postdiscal spots from SC^5 to M^1 ; yellow cell-streaks vestigial.—Hindwing: submarginal patches large, blue crescents larger than in *P. l. pallas*; tail as long as in male, slightly spatulate.

Genitalia of male as in *P. l. pallas*.

Hab. Yucatan; West Mexico; Guatemala.

In the Tring Museum 1 ♂, 1 ♀, from Guadalajara.

77. *Papilio lycophron* Hübn. (1818—?).

Seba, *Thesaur.* p. 13. t. 8. fig. 17. 18. ♀ (1764) ("India").

♂. *Heracleides lycophron* Hübner, *Samml. Exot. Schmett.* ii. t. 100 (1818—?).

♂. *Papilio astyalus* Godart, *Enc. Méth.* ix. p. 62. n. 102 (1819) (Brazil).

♀. *Papilio pirithous* Boisduval, *Spec. Gén. Léop.* i. p. 358. n. 201 (1836) (Uruguay; "Cuba" error loci).

♂♀. Closely agreeing with *P. androgeus* in structure. Submarginal spots on *underside* of forewing larger, those of hindwing much larger above and below; tail usually somewhat spatulate, teeth R^2 and M^1 short.—♀ dichromatic in some districts.

Genitalia nearly the same as in *P. androgeus*, geographically variable, while they are not geographically variable in *P. androgeus*; rasplike ridge of harpe more dorso-ventral in direction than in *P. androgeus*, sometimes developed to a process.—♀. Lateral dentate lobe of vaginal cavity narrower at base and wider at apex than in *P. androgeus*.

Larva similar to that of *P. thoas*, more strongly marmorated, the patches yellow.

Pupa slenderer than in *P. thoas*, the thoracic tubercle longer. On *Citrus*.

Hab. Mexico southward to Argentina and Uruguay; Santa Lucia.

We are not sure that Hübner's name has priority over that of Godart.

The Santa Lucia specimens recorded by Miss Sharpe (*Proc. Zool. Soc. Lond.* 1901. p. 223), if belonging to this species, represent doubtless a distinct subspecies.

Boisduval, *l.c.*, records a form of this species from Cuba under the name of *P. pirithous* Roger, several other authors (Doubleday, Lucas, Felder, Kirby, etc.) following suit. Gundlach (1881) rejects the species as Cuban. There is indeed no evidence that a form of *P. lycophron* occurs on that island, though Lucas (1857) records not only *P. thersites*, but also two forms of the present species from there—namely, *pirithous* and *lycophron*, the latter being stated to be common on the island. The mistake began with Boisduval, who mistook some South American females of *P. lycophron* for Roger's "Papillon *pirithous*." This "Papillon *pirithous*" being from Cuba, the locality of specimens erroneously identified as *pirithous* was accepted to be also Cuba. The description given by Roger has doubtless never been carefully read, since nobody appears to have noticed that it is a description of the male of *P. caiguanabus*!

It is quite possible that a form allied to *P. thersites* or *P. lycophron* will be discovered on Cuba or Haiti.

Seba's figure, *l.c.*, represents doubtless a form of the present species. However, we have not seen a specimen agreeing with the figure. Seba's type came possibly from Surinam.

a. P. lycophron pallas Gray (1852).

♂ ♀. *Papilio oebalus*, Gray (*non* Boisd., 1836, *err. det.*), *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 39. n. 193. t. 6. fig. 1. ♂ (1852) (Mexico); *id.*, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 53. n. 203 (1856); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 311. n. 311 (1864) (Mexico); Kirby, *Cat. Diurn. Lep.* p. 539. n. 148 (1871) (Mexico; *cit. Boisd. excl.*); Oberth., *Et. d'Ent.* iv. p. 71. n. 212 (1880); Stand., *Exot. Tagf.* p. 16 (1884); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 225. n. 56. t. 63. fig. 5. 6. ♀ (1890) (Mexico to Costa Rica); Winkle, *Canad. Ent.* xxv. p. 212 (1893) (only in Mexico).

♂. *Papilio pallas* Doubleday, *List Lep. Ins. Brit. Mus.* i. p. 17 (1845) (*nom. nud.*; Oajaca); *id.*, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 168 (1846) (*nom. nud.*; Mexico); Hewits., *Trans. Ent. Soc. Lond.* (2), i. p. 97 (1851) (*partim*); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 39. n. 193. t. 6. fig. 1. ♂ (1852) (*subsynon.*)

Papilio lycophron, Butler & Druce, *Proc. Zool. Soc. Lond.* p. 365. n. 379 (1874) (Costa Rica).

♂. Forewing with a row of submarginal spots on *upperside*, marginal spots also distinct, band more cut up than in the South American forms, the veins SC⁵, R¹, R², R³ being more broadly black, the central patches of the band more or less rounded distally.—Tail variable, apparently more obtuse in Eastern Mexico than in other localities, and in the same district the black distal area of the hindwing more extended both above and below.

♀. Forewing more uniformly brown-black than in South American specimens; some buff dots distally of apex of cell; submarginal spots SC²—SC⁵, or at least the first, absent.—Hindwing: tail short, sometimes only a little more projecting than the other teeth; three rows of spots, two inner rows often more or less confluent, spots of proximal row either all red or at least the last spot, second row more distinct than in South American females, and third row nearer the margin.

On *underside* a buff band on forewing from costal margin to M¹ or SM², consisting of rather well-defined spots.

Genitalia: ♂. Rasplike ridge of harpe at right angles to the dorsal edge of the harpe.

Hab. Mexico to Costa Rica.

In the Tring Museum 18 ♂♂ from : Mexico ; San Pedro Sula, Honduras.

A series of 8 ♀♀, besides males, from San Pedro Sula in coll. Oberthür.

b. P. lycophron hippomedon Feld. (1859).

- ♂. *Papilio hippomedon* Felder, *Wien. Ent. Mon.* iii. p. 393. n. 34 (1859) (hab. ?) ; id., *Verh. Zool. Bot. Ges. Wien* xiv. p. 311. n. 309 (1864) (Venezuela).
 ♂. *Papilio polycæon* var., or nov. spec., Vollenhoven, *Tijdschr. Ent.* iii. p. 86. n. 142a (1860) (Bogota).
 ♂. *Papilio theophron* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 311. n. 308 (1864) (*nom. in descr.* ; Bogota) ; id., *Rivis Novara, Lep.* p. 76. n. 59 (1865) ; Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 126. n. 237 (1880) (Sta. Marta) ; Hahnel, *Iris* iii. p. 201 (1890) (Valera, Venez.).
 ♂. *Papilio lycophron* var. *b. P. theophron* Kirby, *Cat. Diurn. Lep.* p. 540. sub n. 150 (1871) (New Granada).
 ♂. *Papilio lycophron* var. *c. P. hippomedon*, id., *l.c.* (Venezuela).
 ♂. *Papilio lycophron*, Hahnel, *l.c.* p. 201 (1890) (Valera) ; Maass. & Weym., in Stübel, *Revue S. Amer., Lep.* p. 11. n. 40 (1890) (Colombia).

♂. A small form, differing from the Brazilian subspecies especially in the hindwing being more rounded, in the submarginal spots of the same being smaller and standing much nearer the edge of the wing, and in the tail being short and slender.

Genitalia : ♂. Rasplike ridge of harpe extending in the same direction as the upper edge of the harpe, being longitudinal, not transverse in direction, and being moreover somewhat angulate.

♀ not known.

Hab. Colombia and Northern Venezuela.

In the Tring Museum 8 ♂♂ from : " N. Granada " ; Venezuela.

c. P. lycophron phanias subspec. nov.

- ♂. *Papilio lycophron*, Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 347 (1861) (Cameté, Tozantins) ; id., *Journ. Entom.* i. p. 228. n. 26 (1862) ; Dognin, *Lép. Loja* p. 15 (1867) ; id., *l.c.* p. 37 (1891) ; Weeks, *Illust. Diurn. Lep.* p. 20 (1905) (Chulumani).
Papilio theophron, Hahnel, *Iris* iii. p. 283 (1890) (Pebas) ; Michael, *ibid.* vii. p. 213 (1894) (Sao Paulo de Olivença).

♂. Larger than *P. l. hippomedon*.—Forewing : band more broken anteriorly than in *P. l. lycophron*, and the cell-spot on the whole smaller ; spot SC³—SC⁴ absent from nearly all specimens.—Hindwing more strongly dentate than in *P. l. hippomedon*, rather shorter posteriorly than in *P. l. lycophron* ; submarginal spots almost in the same position as in *l. hippomedon*, being smaller and more distal than in *P. l. lycophron*.

Underside, forewing : submarginal spots linear, smaller than in *l. lycophron*, costal margin at apex and veins SC³ to R² more extended black-brown.—Hindwing : black discal area bearing the rufous red and the blue spots on the whole larger than in *hippomedon* and *lycophron* ; yellow submarginal spots all separated, the last three or four smaller than in the other South American forms ; black marginal border a little wider than in *hippomedon*, but narrower than in the specimens of *lycophron*, in which the submarginal spots are not strongly enlarged.

♀. Only one specimen known to us, resembling the dark form of ♀ *P. l. lycophron*.

Upperside : forewing black-brown from base to apex of cell, then paler, some small ill-defined yellow spots around apex of cell ; vestiges of yellow submarginal

spots in posterior half.—Hindwing strongly dentate, tail slender, non-spatulate, the specimen resembling in this respect *P. androgycus*; submarginal spots much closer to margin than in *l. lycophron*, buff, posterior ones slightly greenish, all shaded with black.

Underside.—Forewing: no distinct cell-patch; a row of small creamy buff spots around apex of cell, the row continued on disc by a triangular spot R^2-M^1 , this being the largest of all, being about as long as broad, upon which follows a small indistinct double-spot M^1-M^2 ; a row of submarginal spots from SC^5 to SM^2 , proximally of which there is a thin interrupted line disappearing anteriorly; between discal spots and apex of wing there are hardly any buff scales.—Hindwing: submarginal spots less strongly curved than in *l. lycophron*, much nearer the margin, the black marginal border being between the veins half the width of the spots or less; interspace between submarginal and rufous red discal spots about three times the width of the submarginal spots, first spot excepted; white fringe nearly continuous, being narrowly interrupted at the veins.

Genitalia as in *P. l. hippomedon*.

Hab. Eastern Ecuador (type) to Bolivia and Matto Grosso, eastwards to Pará and the Orinoco.

In the Tring Museum 48 ♂♂, 1 ♀, from: Snapure, Caura R., Orinoco, March 1899 (S. M. Klages); La Union, Caura R., August 1901 (Klages); Itaituba; Zamora (O. T. Baron); R. Cachyaco, affluent of R. Huallaga (Stuart); R. Chuchnras, affluent of R. Palcazu, 320 m. (W. Hoffmanns); Peréné, 3000 ft., October—November 1903 (Watkins); Mapiri; Reyes, August 1895 (Stuart); Villa Maria to Diamantino, Matto Grosso, January 1897 (Audeer).

d. P. lycophron lycophron Hübn. (1818—?)

- ♂. *Heracles lycophron* Hübner, *Samml. Exot. Schmett.*, ii. t. 100 (1818—?).
- ♂. *Papilio astyalus* Godart, *Enc. Méth.* ix. p. 62. n. 102 (1819) (Brazil); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 17 (1845) (= *thersites* ?; Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petrop., Lép.* i. p. 4. n. 62 (1857) (Brazil).
- ♂. *Papilio mentor* Dalman, *Anal. Ent.* p. 37. n. 2 (1823) (Brazil ?).
- ♂. *Papilio lycophron*, Boisduval, *Spec. Gén. Lép.* i. p. 352. n. 194 (1836) (Brazil; “♀ resembles ♂” false; var. A. alia species = *himeros*); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 167 (1846).
- ♂ ♀. *Papilio lycophron* Hewitson, *Trans. Ent. Soc. Lond.* (2). i. p. 97 (1851) (♂ of “*perithous*”); Doubl., Westw. & Hew., *l.c.* ii. p. 529 (1852); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 38. n. 192 (1852) (Brazil); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 53. n. 201 (1856) (Brazil); Lucas, in Sagra, *Hist. Cuba* vii. p. 206 (1857) (“Cuba” error loci); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 311. n. 306 (1864) (Brazil; Uruguay.—“Amazonia inf.” alia subsp.); Kirby, *Cat. Diurn. Lep.* p. 540. n. 150 (1871) (var. b and c excl.); Burm., *Descr. Rép. Argent.* v. *Lép.* p. 60. n. 3 (1878) (*partim*; Corrientes; Buenos Aires); id., *l.c. Atlas* p. 5. n. 5 (1879); Gosse, *Entom.* xiii. p. 194 (1880) (Corrientes); Obertb., *Et. d’Ent.* iv. p. 70. n. 211 (1880) (Brazil); Honr., *Berl. Ent. Zeit.* xxxii. p. 500. fig. B (1888) (gynandromorphous specimen; Sao Paulo); Weym., *Stett. Ent. Zeit.* lv. p. 315. n. 12 (1895) (Rio Grande do Sul); Bönningh., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 26 (1896) (Sa. Theresa); Lathy, *Trans. Ent. Soc. Lond.* p. 69. n. 38 (1904) (a ♂ without submarg. spots on upperside of hindwing).
- ♀. *Papilio pirithous* Boisduval, *l.c.* p. 358. n. 201 (1836) (Uruguay; “Cuba” false;—“*Papillon pirithous* Roger” alia spec. = *caiguanabus*); Doubl., Westw. & Hew., *l.c.* i. p. 17. n. 175 (1846) (Uruguay; “Cuba?” error loci); Ménétr., *l.c.* p. 4. n. 64 (1857) (“Cuba” false).
- ♀. *Papilio oebalus* Boisduval, *l.c.* p. 360. n. 204 (1836) (hab. ?); Doubl., Westw. & Hew., *l.c.* i. p. 17. n. 177 (1846) (S. America); Hewits., *Trans. Ent. Soc. Lond.* (2). i. p. 97 (1851) (= ♀ of *pallas* ?); Kirby, *l.c.* p. 539. n. 148 (1871) (*partim*).
- Papilio drepanon* Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 53. n. 202 (1856) (*nom. nud.*; Rio Grande do Sul—doubtless a ♀ of *lycophron*).

Papilio lycophron (!), Hewitson, *l.c.* p. 97 (1851) (Brazil); Mabilde, *Guia Pract. Borbol. Rio Grande do Sul* p. 49 (1896)

Papilio perithous (!), Hewitson, *l.c.* (sub synon.).

♂ ♀. *Papilio pyrrithous* (!), Lucas, in Sagra, *Hist. Cuba* vii. p. 267 (1857) ("Cuba" false); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 311. n. 307 (1864) ("Cuba" false).

♀. *Papilio lycophron* var. a. *P. pirithous*, Kirby, *Cat. Diurn. Lep.* p. 540. sub n 150 (1871) ("Cuba" error loci).

♂. *Calaides lycophron*, Kirby, in Hübn., *Samml. Exot. Schmett.* ed. ii. p. 97. t. 313. fig. 1. 2 (190-?).

♂. *Upperside*, forewing: submarginal spots often present; subapical spots SC³—SC⁴ seldom absent; veins SC¹ to R² narrowly black.—Hindwing: submarginal spots variable in size, but their centres always farther away from margin than in the other South American subspecies.

Underside, forewing: submarginal spots usually large, often joined to the marginal spots.—Hindwing: extent of black discal area very variable, often hardly any black scaling left; submarginal spots large, contiguous, sometimes joined to the marginal spots, but in most specimens the black marginal border continuous and broader than in *P. l. hippomedon* and *phanias*; occasionally some yellow scaling in centre of tail.

♀. Dichromatic.

a. ♀-f. *oebalus* Boisd., *l.c.*—Hindwing from near base to black discal band pale creamy buff, this colour extending on to forewing as far as cell, there being a spot of the same colour in the apex of the cell; in the palest specimens the buffish band reaching to costal margin.

b. ♀-f. *pirithous* id., *l.c.*—Both wings almost uniformly brown above, with a row of pale buff submarginal spots, which are often much shaded with brown.

Hab. Brazil; Paraguay; Argentina.

A common insect.

In the Tring Museum: 100 ♂♂, 34 ♀♀ and some larvae and pupae from: Tucuman (J. Steinbach; P. Girard); Tapia, Tucuman (Baer); Sapucay, Paraguay (W. Foster); Patino Cué, February (Montforts); Yhu, Paraguay, September—December 1896 (Andeer); Corrientes; Blumenau; S. Catharina; Castro, Parana (E. D. Jones); S. Paulo; Rio de Janeiro; Espiritu Santo; Minas Geraes; Bahia.

78. *Papilio androgeus* Cram. (1775).

Merian, *Ins. Surinam*, t. 31 (1705) (♂, ♀, larva, pupa).

♂. *Papilio Eques Trojannus androgeus* Cramer, *Pap. Exot.* i. p. 24. t. 16. fig. C. D (1775) (Surinam).

Papilio (orestes), Meerburgh, *Afb. Zeldz. Gew.* t. 26. 30. ♂ (1775).

♂. *Papilio Eques Achirus polycaon* Cramer, *l.c.* iii. p. 17. t. 203. fig. A. B (1779) (Surinam).

♀. *Papilio Eques Achirus piranthus* Cramer, *l.c.* iii. p. 18. t. 204. fig. A. B (1779) (Surinam).

Papilio Eques Trojannus amosis, Stoll, in Cramer, *l.c. Suppl.* p. 1. t. 1. fig. 1 A. B. larva, pupa (1787) (this species?).

♂ ♀. *Papilio polycaon*, Boisduval, *Spec. Gén. Léop.* i. p. 361. n. 205 (1836) (= *androgeus* = *pyranthus*! = *laodocus*); Haase, *Untersuch. Mimicry* i. p. 97 (1893).

Papilio piranthus (!), Weidemeyer, *Proc. Ent. Soc. Philad.* ii. p. 148 (1863) (sub synon.).

♂ ♀. *Papilio androgeus*, Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 311. n. 312 (1864) (West Indies; Central and South America); Hopff., *Stett. Ent. Zeit.* xl. p. 52. n. 21 (1879).

♂ ♀. *Papilio androgeus* (!), Kirby, *Cat. Diurn. Lep.* p. 539. n. 147^{bis} (1871) (South and Central America); Staud., *Exot. Tagf.* p. 15. t. 10. ♂ ♀ (1884) (Chiriqui; Surinam; Amazons; Brazil).

♂ ♀. Sexes dissimilar in colour, the females being dichromatic in certain districts. Submarginal spots absent from upperside of forewing or vestigial, thin and linear on underside.—Hindwing: tail narrow, non-spatulate, teeth R²

and M¹ usually somewhat produced, especially in female; submarginal spots thin crescents on upperside; on underside, proximally of the submarginal spots, a row of blue lunules, and proximally of these and parallel with them a row of rufous red crescents.

Genitalia: ♂. Tenth tergite spatulate. Clasper and harpe broad; the latter about two-thirds the length of the former, rounded at apex, bearing ventrally a long pointed conical process directed distad and reaching a little beyond the apex; at dorsal margin of harpe an oblique ridge bearing numerous curved, conical, pointed teeth, forming a kind of rasp.—♀. Edge of vaginal orifice raised right and left into a rounded lobe, and proximally into a kind of smooth ridge which extends into the orifice, being narrowed posteriorly; behind the orifice a membranaceous lobe or tubercle densely clothed with minute hairs: laterally of the orifice a broad brown flap bearing several acute teeth; anal segment with a few short stout bristles on innerside.

Larva and pupa first figured by Merian, and later by Burmeister, Sepp, and others (see literature below). Both Sepp and Burmeister considered the caterpillar represented by Stoll, in Cramer, *Pap. Exot. Suppl.*, t. 1. fig. 1, to be that of the present species, not of *P. amosis* = *hyppason* as stated by Stoll. We are not sure that those authors were right. Stoll's figure bears distinct tubercles, such as are found in *P. epinectes* and allies, to which group *P. hyppason* belongs, while the adult caterpillar of *P. androgeus* has no distinct tubercles.

Hab. West Indies, Mexico southward to Paraguay and Parana, Brazil.

Three subspecies, which differ constantly only in the females.

a. P. androgeus epidaurus Godm. & Salv. (1890).

- ♂ ♀. *Papilio polyeaon* var. **b**, Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 36. sub n. 173 (1852) (Guatemala); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 48. sub n. 181 (1856) (*partim*; S. Domingo; Guatemala).
- ♂ ♀. *Papilio androgeus*, Felder, *l.c.*; Herr.-Sch., *Corresp. Bl. Zool. Min. Ver. Regensb.* p. 172. n. 3 (1864) (Cuba); Hopff., *l.c.*; Gundl., *Papilio* i. p. 113 (1881) (Cuba); Möschl., *Abh. Senkenb. Nat. Ges.* xvi. p. 91. n. 1 (1891) (Porto Rico, ♀ *piranthus*).
- ♂ ♀. *Papilio polyeaon*, Poey, *Mem. R. Soc. Econ. Habana* p. 2346 (1846) (Cuba); Lucas, in Sagra, *Hist. Cuba* vii. p. 204 (1857); Bates, *Proc. Zool. Soc. Lond.* p. 242. n. 3 (1863) (Panama); Reakirt, *Proc. Ent. Soc. Philad.* ii. p. 137. n. 3 (1863) (syn. excl.; Honduras); Butl. & Druce, *Proc. Zool. Soc. Lond.* p. 365. n. 380 (1874) (Costa Rica); Dewitz, *Stett. Ent. Zeit.* xxxviii. p. 233. n. 1 (1877) (Porto Rico, one ♀-form); Gundl., *Contr. Ent. Cuba.* p. 134 (1881); id., *An. Hist. Nat. Madrid* xx. p. 113. n. 1 (1891) (Porto Rico).
- ♂ ♀. *Papilio polyeaon* var., Weidemeyer, *Proc. Ent. Soc. Philad.* ii. p. 147 (1863) (syn. excl.; West Indies; Central America).
- Papilio piranthus*, Butler, *Proc. Zool. Soc. Lond.* p. 714 (1901) (Sta. Lucia).
- Papilio androgeus* (!), Stand., *Exot. Tagf.* p. 15 (1884) (*partim*; Chiriqui).
- ♂ ♀. *Papilio epidaurus* Godman & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 224. n. 55. t. 69. fig. 1. 2. ♀, 3. genit. (1890) (Mexico to Panama; S. Domingo).

♂. Yellow area of both wings on the whole more extended than in the South American forms; the small patch in front of the subcostal fork of the forewing usually larger.

♀. Only one form known. Forewing with small yellow patches or vestiges of them around upper angle of cell, the patches larger below than above, forming a curved band; no patch in cell or on disc, but there are sometimes some yellow scales in the apex of cell on underside.—Greenish blue scaling on disc of hindwing denser than in the other forms, the blue area being rather sharply defined proximally, entering cell.

Hab. Mexico to Panama; Cuba; Haiti; Santa Lucia.

The only S. Lucia specimen which we have seen (♂ in Brit. Mus.) has no black dorsal line on abdomen; the submarginal crescents of the hindwing are rather large.

In the Tring Museum 20 ♂♂, 6 ♀♀, from: Cuba; Haiti; Songolica, Mexico, June 1899 (W. Schans); Orizaba; Guatemala (Salvin); San Pedro Sula, Honduras; Costa Rica; Chiriqui; Bogava, Chiriqui, 800 ft. (Watson); Brava I., (Ebaco I., and Parida I., January 1902 (Batty).

b. P. androgeus androgeus Cram. (1775).

- Merian, *Ins. Surinam*. t. 31 (1705) (♂ ♀, larva, pupa); id., *l.c.* t. 67. ♀ (1719); Kleemann, *Beitr. Nat. Ins. Gesch.* i. p. 63. t. 8. fig. 1. 2. ♂, t. 9. fig. 1. 2. ♀ (1756); Seba, *Thesaur.* iv. p. 46. t. 38. fig. 13. 14. ♀, p. 47. t. 39. fig. 2. 3. ♂ (1764).
- Papilio Eques Trojanns polydamus* Linné, *Syst. Nat.* ed. x. p. 460. n. 11 (1758) (*partim*; citat. Merian t. 31); Fabr., *Syst. Ent.* p. 447. n. 22 (1775) (*partim*); id., *Ent. Syst.* iii. 1. p. 14. n. 42 (1793) (*partim*).
- ♀. *Papilio Eques Achivus glaucus*, Fabricius (*non* Linné, 1758, err. det.), *Syst. Ent.* p. 445. n. 14 (1775) (*partim*); Goeze, *Naturf.* ix. p. 76 (1776).
- ♀. *Papilio Eques Trojanns androgeus* Cramer, *l.c.*; Fabr., *Gen. Ins.* p. 251. n. 22-3 (1776); Goeze, *Ent. Beitr.* iii. 1. p. 43. n. 15 (1779); Fabr., *Spec. Ins.* ii. p. 8. n. 30 (1781); Jabl. & Herbst, *Naturs. Schmett.* ii. p. 105. n. 29. t. 11. fig. 2. 3. t. 12. fig. 1 (1784) ("Merian's t. 31. erroneously quoted by Linné and Fabricius under *polydamus*"); Fabr., *Mant. Ins.* ii. p. 4. n. 32 (1787); Gmelin, *Syst. Nat.* i. 5. p. 2231. n. 290 (1790); Jung, *Alphab. Verz. Schmett.* p. 35 (1791); Fabr., *Ent. Syst.* iii. 1. p. 15. n. 43 (1793); Esper, *Aust. Schmett.* p. 138. n. 63. t. 36. fig. 1 (1798).
- ♂. *Papilio Eques Achivus polycæon* Cramer, *l.c.* iii. p. 17. t. 203. fig. A, B (1779) (Surinam); Fabr., *Spec. Ins.* ii. p. 19. n. 78 (1781); id., *Mant. Ins.* ii. p. 10. n. 89 (1787); Jabl. & Herbst, *l.c.* iii. p. 133. n. 92. t. 41. fig. 1. 2 (1788) (larva excl.); Gmelin, *l.c.* p. 2236. n. 307 (1790); Fabr., *Ent. Syst.* iii. 1. p. 33. n. 96 (1793); Esper, *Aust. Schmett.* p. 200. n. 91. t. 49. fig. 2 (1798).
- ♀. *Papilio Eques Achivus piranthus* Cramer, *l.c.* iii. p. 18. t. 204. fig. A, B (1779) (Surinam).
- ♀. *Papilio Eques Achivus peranthus* (!), Jablonsky & Herbst, *Naturs. Schmett.* ii. p. 111. n. 30. t. 12. fig. 2 (1784); Esper, *Aust. Schmett.* p. 81. n. 35. t. 20. fig. 1. 2 (1788) (Surinam; Cayenne).
- ♀. *Papilio Eques Trojanns androgeus* β) *Papilio ucanthus* Gmelin, *Syst. Nat.* i. 5. p. 2231. sub n. 290 (1790) (*laps. cul.*; *piranthus*?).
- ♂. *Calaides polycæon*, Hübner, *Verz. bek. Schmett.* p. 86. n. 891 (1818?).
- ♀. *Calaides androgeus*, id., *l.c.* n. 892 (1818?).
- ♀. *Calaides piranthus*, id., *l.c.* n. 893 (1818?); id., *Samml. Ecot. Schmett.* ii. t. 110 (1822?); Kirby, *ibid.*, ed. ii. p. 98. t. 323. fig. 3. 4 (190-?) (liter. and habitat *partim*).
- ♂. *Papilio polycæon*, Godart, *Enc. Méth.* ix. p. 41. n. 48 (1819) (*partim*; Gnyane).
- ♀. *Papilio androgeus*, id., *l.c.* ix. p. 41. n. 49 (1819) (*partim*; Guyane; = *laodocus* = *pyranthus*! = *peranthus* = *glaucus*).
- ♂ ♀. *Papilio polycæon*, Boisduval, *Spec. Gén. Léop.* i. p. 361. n. 205 (1836) (*partim*; Guyane; = *androgeus* = *pyranthus*! = *laodocus*); Lucas, in Guér., *Diet. Pitt. Hist. Nat.* vii. p. 5 (1838) (♀ = *androgeus*); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 152 (1846) (*partim*; Guiana); Sepp, *Vlind. Surinam* iii. p. 147. 148 (1853) (larva, pupa, ♂ ♀); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Amazons); Bates, *ibid.* (2). v. p. 346 (1861) (common in open places throughout the Amazon region); id., *Journ. Entom.* i. p. 228. n. 25 (1862) (common throughout the Amazons); id., *Natural. Riv. Amaz.* p. 52 (1864) (Pará, in street); Obertb., *Et. d'Ent.* iv. p. 72. n. 216 (1880) (Carare, Colombia; Cayenne; Sautarem); Michael, *Iris* vii. p. 213 (1894) (Sao Paulo de Olivença).
- ♂ ♀. *Papilio androgeus*, Felder, *l.c.*; Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 126. n. 238 (1880) (Sta. Marta).
- ♂ ♀. *Papilio androgeus* (!), Kirby, *Cat. Diurn. Lep.* p. 539. n. 147^{bis} (1871) (*partim*); Druec, *Proc. Zool. Soc. Lond.* p. 246. n. 14 (1876) (Peru: Huasampilla, 10,000 ft.); Staud., *Errot. Tagf.* p. 15. t. 10. ♂ ♀ (1884) (*partim*; Amazons); Hahnel, *Iris* iii. p. 194 (1890) (Mérida); id., *l.c.* p. 201 (1890) (Valera, Venez.); Maass & Weym., in Stübel, *Reisen S. Amer.*, *Lep.* p. 18. n. 30 (1890) (Magdalena valley, 800—1500 m.); Kaye, *Trans. Ent. Soc. Lond.* p. 207. n. 197 (1901) (Trinidad).
- Papilio androgeus* (!), Müschler, *Verh. Zool. Bot. Ges. Wien* xxxii. p. 304 (1883) (Surinam).

♂. Usually deeper yellow than the Brazilian form; the spots in front of cell of forewing, *upperside*, rather larger in the majority of specimens, and the submarginal bars of the *underside* mostly thinner; black dorsal line of abdomen often vestigial, sometimes absent.

♀. Dichromatic.

a. ♀-f. *androgeus* Cram. *l.c.*—Forewing: yellow patches R^2 — M^1 of about equal length, occasionally a spot before R^2 , patch R^3 — M^1 often shaded with black; greenish or greyish blue discal area of hindwing entering cell.

b. ♀-f. *piranthus* id., *l.c.*—Forewing without yellow patches on *upperside*, sometimes vestiges of the patches on *underside*, rarely also on *upper*; greenish or greyish blue discal scaling of hindwing rather diffuse, entering cell.

Hab. Colombia to Trinidad, the Guianas, Amazons, southward to Bolivia and western Matto Grosso.

In the Tring Museum 58 ♂♂, 25 ♀♀, from: R. Dagua, W. Colombia (Rosenberg); Pereira, Cauca; "Bogotá"; Marawal, Trinidad, August 1891; Lower Orinoco, November 1897 (Cherrie); Temblador, Maripa, La Vuelta and La Union, Caura R., Orinoco, May, September and October (S. M. Klages); Essequibo R.; Surinam; Obidos (Mathan); R. Cachyaco, affluent of R. Huallaga (Stuart); Paramba, N.W. Ecuador, 3500 ft. (Flemming & Miketta); Cachabí, N.W. Ecuador (Rosenberg); R. Chuehuras, affluent of R. Palcazu, 320 m. (W. Hoffmanns); Perené R., March 1900 (Simons); Pozuzo (W. Hoffmanns); Chanchamayo (Schunke); Cuzco, February 1901 (Garlepp); Caradoc, Marepata R., February 1902, 4000 ft. (Ockenden); Mapiiri R.; Guanay, Mapiiri, 1500 ft., August 1895 (Stuart); Ynngas de la Paz, 1000 m., September 1899 (Garlepp); Prov. Sara, S. Cruz de la Sierra (J. Steinbach); Villa Maria to Diamantino, Matto Grosso, January 1897 (Andeer).

e. P. androgeus laodocus Fabr. (1793).

- ♀. *Papilio Eques Trojans androgeus* Stoll (*non* Cramer, 1779, *err. det.*), in Cram., *Pap. Erot.* iv. p. 317. t. 350. fig. A. B (1781) (Brazil); Esper, *Aust. Schmett.* p. 138. n. 63. t. 36. fig. 2 (1798) (*partim*).
- ♀. *Papilio Eques Trojans laodocus* Fabricius, *Ent. Syst.* iii. 1. p. 8. n. 23 (1793) (*partim*).
- ♂. *Papilio polycæon*, Godart, *Enc. Méth.* ix. p. 41. n. 48 (1819) (*partim*; Brazil).
- ♀. *Papilio androgeus*, id., *l.c.* p. 41. n. 49 (1819) (*partim*; Brazil).
- ♀. *Papilio laodocus*, Donovan, *Nat. Repos., Ent.* ii. t. 130 (1823) (Brazil).
- ♂♀. *Papilio polycæon*, Ménétr., *Mém. Soc. Imp. Moscou* vii. p. 188. n. 4 (1829) (Brazil, larva); Boisduval, *l.c.*; Doubl., *List Lep. Ins. Brit. Mus.* i. p. 17 (1845) (Brazil); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 152 (1846) (*partim*; Brazil); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 35. n. 173 (1852) (Brazil); Lucas, in Chenu, *Enc. Hist. Nat., Pap.* p. 38. t. 6. fig. 2. ♂ (1851-3) (Brazil); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 48. n. 181 (1856) (*partim*; Brazil); Lucas, *Bull. Soc. Ent. France* p. 25 (1857) (♀, aberration, Rio de Jan.); Burm., *Deser. Rép. Argent. v. Léps.* Atlas p. 4. n. 4. t. 2. fig. 2. larva (1879) ("the same as Stoll's t. 1. fig. 1"); Gosse, *Entom.* xiii. p. 194 (1880) (Corrientes & Paraguay); Seitz, *Stett. Ent. Zeit.* li. p. 97 (1890) (Corcovado); Bönningh., *Verh. Ver. Nat. Unterholt. Hamburg* ix. p. 26 (1896) (Rio de Janeiro).
- ♂. *Calaides polycæon*, Geyer, in Hübn., *Samml. Erot. Schmett.* iii. t. 26. fig. 1. 2 (1834) (Brazil).
- ♂♀. *Papilio androgeus*, Felder, *l.c.*; Butler, *Cat. Diurn. Lep. descr. Fabric.* p. 247. n. 46 (1869) (Brazil).
- ♂♀. *Papilio androgeus* (?), Kirby, *Cat. Diurn. Lep.* p. 539. n. 147^{bis} (1871) (*partim*); Staud., *Erot. Tagf.* p. 15 (1884) (*partim*; Brazil); Maas & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 91. n. 39 (1890) (S. Catbarina?); Peters, *Illustr. Zeitschr. Ent.* ii. p. 51 (1897) (Nova Friburgo, larva on *Citrus*).
- Calaides androgeus*, Kirby, in Allen, *Nat. Lib., Butt.* ii. p. 283 (1897).
- Calaides androgeus* (?), id., in Hübn., *Samml. Erot. Schmett.* ed. ii. p. 98. t. 464. fig. 1. 2 (190-?) (liter. et hab. *partim*).

♂. Yellow band pale; the small spots standing in front of upper angle of cell of forewing reduced, being often absent. Length of streak in subcostal fork as variable as in the other forms; apex of cell of hindwing sometimes black. We have a curious ♂ (Sapucay, Paraguay) bearing patches of the colour of the ♀; the left clasper of this specimen is somewhat reduced.

♀. Monochromatic, the only form corresponding to *P. a. androgeus* ♀-f. *androgeus*. Forewing: yellow patch R^3-M^1 much larger than patch R^2-R^3 , the latter being reduced distally; often a small patch M^1-M^2 present, standing behind the distal portion of patch R^3-M^1 .—Hindwing: greenish blue scaling forming a band of patches which stands always separate from cell.

Hab. Brazil; Paraguay.

In the Tring Museum 48 ♂♂, 14 ♀♀, from: Sapucay, Paraguay, September to February (W. Foster); Yhu, Paraguay, September to December 1896 (Audeer); Castro, Parana (E. D. Jones); Bahuru, S. Paulo (Dr. Hempel); Rio de Janeiro; Petropolis (Foetterle); Nova Friburgo; Tijuca.

VI. Glaucus Group.

Cell of the hindwing (except *P. pilumnus*) enlarged, strongly asymmetrical, much broader between SC^2 and M^2 than in any other American species. Basal cellule of hindwing long. Fifth black band of forewing connected at costal margin with distal marginal border, forming a kind of C along the costal edge; a black median band on hindwing joining posteriorly the black abdominal border, the two bands forming a large V. Abdomen beneath striped with black and yellow. *P. pilumnus* stands somewhat isolated in this group. The other five species which belong here (*P. glaucus*, *rutulus*, *alexiares*, *eurymedon* and *daunus*) are very closely allied with one another. If these five insects inhabited separate districts there would be good reasons for treating them as subspecies of one species. But as *P. daunus*, *eurymedon* and *rutulus* occur together, and are known to be independent of each other, each breeding true, and *P. daunus* and *alexiares* are also found together (in Eastern Mexico at least, *alexiares* having a restricted range), these Papilios are certainly quite distinct. As further the morphological differences between these species are not more trenchant than those between any of these insects and *P. glaucus*, we must consequently treat *P. glaucus* also as a species independent of the others. That these Papilios are developments from the same ancestral form there can be no doubt.

The sexual armature is of the same type in those five species—resembling to a certain extent the genitalia of *P. lycophron* and *aristodemus*. The tenth tergite of the ♂ is long, being slightly spatulate; the sternite bears a small oblique double ridge at each side. The harpe is broad, being produced ventrally at the apex into a long conical pointed process; the oblique dorso-apical edge of the harpe is more or less dentate, being dorsally produced into a simple or a dentate hook which is curved anad.—♀. The edge of vaginal orifice is proximally raised into a long process which is more or less lanceolate; at each side of the orifice there is a large dentate flap and proximally of this flap two folds; behind the orifice there is a membranaceous tubercle or projection which is densely covered with minute hairs.

The larva bears an eye spot on each side of the third thoracic segment sub-dorsally, and a black transverse dorsal line on the fourth, this line not being present in *P. pilumnus*.

Key to the species.

- a. Cell of hindwing nearly symmetrical. Species No. 84.
 Cell of hindwing asymmetrical b.
- b. The subapical costal ∞ -shaped spot of forewing below with sharply defined buff or yellow centre, the edges remaining pure black e.
 The ∞ -mark without sharply defined buff or yellow centre c.
- c. Tooth M^1 of hindwing long; fourth black band of forewing narrower than the yellow apical cell-space (δ), or at least not wider (♀) Species No. 81.
 Tooth M^1 short d.
- d. Submarginal spots of underside of hindwing nearly all stained with orange, at least in centre Species No. 79.
 The last two spots orange, the other buff, or the first one also orange and the middle ones with a trace of orange Species No. 83.
- e. Ground-colour buffish white Species No. 82.
 Ground-colour yellow Species No. 80.

79. *Papilio glaucus* L. (1758).

Mouffet, *Ins. Theatr.* p. 98, fig. (1634); Petiver, *Mus.* p. 50, n. 505 (1703); Rajus, *Hist. Ins.* p. 111, n. 2 (1710); Catesby, *Nat. Hist. Car., Flo., Bahama Is.* ii. t. 83 (1743).

♀ . *Papilio Eques Trojanius glaucus* Linné, *Syst. Nat.* ed. x. p. 460, n. 9 (1758) (Amer. sept.); Clerck, *Icon. Ins.* ii. t. 24, fig. 1. ♀ (1764).

Papilio Eques Achirus ajax Linné, *Syst. Nat.* ed. x. p. 462, n. 26 (1758) (*partim*; cit. *Raj. ins.* iii. n. 2).

♀ . *Papilio Eques Achirus antilochus* id., *Syst. Nat.* ed. x. p. 463, n. 28 (1758).

δ . *Papilio Eques Achirus turnus* id., *Mant. Plant.* p. 536 (1771) (*partim*).

δ ♀ . *Papilio glaucus*, Kirby, *Cat. Diurn. Lep.* p. 565, n. 316 (1870) (= *antilochus* = *turnus* = *alcidamas*).

δ ♀ . *Papilio turnus*, Edwards, *Trans. Amer. Ent. Soc.* vi. p. 11, n. 17 (1877) (Atlantic States to Rocky Mts.; Brit. America to Mackenzie R.; Alaska; Canada; Nova Scotia; Newfoundland).

δ . *Upperside*.—Forewing: yellow subbasal interspace strongly narrowing costad, triangular; subapical ∞ -mark centred with a yellow streak, the proximal and posterior edges of the spot remaining pure black; the yellow spot SC^3 — SC^4 situated immediately behind the ∞ -mark smaller than spot SC^4 — SC^5 ; subapical submarginal yellow dot small, rounded.—Hindwing: first submarginal spot usually orange; tail more or less strongly spatulate, asymmetrical.

Underside.—Forewing: ∞ -mark broadly centred with buff, the black border around the buff spot SC^3 — SC^4 remaining pure black, the buff-scaling of the ∞ -mark continuous with the similarly coloured powdery line situated on the black postdiscal band; the buff scaling absent from the ∞ -mark in one of our British Columbian specimens, the ∞ -mark being much reduced in the individual.—Hindwing: the last two submarginal spots orange, some of the other submarginal spots being also more or less washed with orange; disc with some more or less large orange patches R^2 — SM^2 situated proximally of the black postdiscal line. Several melanistic males have been found.

♀ . Dichromatic in the southern districts. One form similar to male, the black bands more extended and the blue patches of the hindwing orange, more or less rounded. The second form of female blackish brown, the black bands more or less vestigial, being more distinct beneath than above, the submarginal spots remaining yellow respectively orange. Intermediate specimens rare.

Genitalia : ♂. Process of harpe situated proximally of most distal point of apex, the apical edge of the harpe being rotundate-angulate ; oblique dorsal edge of harpe bearing at least two strong hooks at the upper corner, and several prominent teeth near these hooks, there being occasionally also some teeth at the ventral edge ; individual variability considerable. — ♀. Process in front of vaginal orifice lanceolate, pointed, rarely bidentate at tip ; dentate lateral flaps standing farther ahead than the orifice.

For early stages see Edwards and others (see literature below).

One brood in the north, two or more in the south ; the spring specimens (from hibernated pupae) of the southern districts are smaller than the summer specimens.

Hab. Alaska, British Columbia, eastwards to Newfoundland and southwards to Florida and Texas, not in the Pacific (and Rocky Mts.) district of the United States.

Two geographical forms, southern spring specimens somewhat resembling the small northern form, but being easily distinguishable by the much narrower black abdominal border to the hindwing. The geographical boundary line between the northern and southern forms is in the lake district, and it is probable that the two forms completely intergrade in Southern Canada. Observations on this point are wanting. As far as we could, we have kept separate the literature on the two forms. It is to be hoped that in future local records of this species it will be expressly stated by the authors which of the two forms occurs, this being especially desirable in records from southern Canada and the northern districts of the United States.

a. P. glaucus glaucus L. (1758).

♀. *Papilio Eques Trojanus glaucus* Linné, *l.c.* (1758) ; Clerck, *l.c.* (1764) ; Linné, *Mus. Lud. Utr.* p. 190. n. 9 (1764) ; Houtt., *Naturl. Hist.* i. 11. p. 194. n. 9 (1767) ; Fabr., *Syst. Ent.* p. 445. n. 14 (1775) (cit. Kleem. excl. ; cit. Linn. "746" falsa) ; Cramer, *Pap. Exot.* ii. p. 64. t. 139. fig. A. B (1777) ; Goeze, *Ent. Beytr.* iii. p. 33. n. 9 (1779) ; Fabr., *Spec. Ins.* ii. p. 5. n. 18 (1781) ; Jabl. & Herbst, *Naturs. Schmett.* ii. p. 229. n. 47. t. 17. fig. 1. 2 (1784) ; Esper, *Austl. Schmett.* p. 27. n. 9. t. 5. fig. 1 (1785) ; Fabr., *Mant. Ins.* ii. p. 3. n. 18 (1787) ; Gmelin, *Syst. Nat.* i. 5. p. 2229. n. 9 (1790) ; Fabr., *Ent. Syst.* iii. 1. p. 4. n. 11 (1793).

Papilio Eques Achirus ajax Linné, *l.c.* (partim).

♂. *Papilio Eques Achirus antilochus* id., *l.c.* ; id., *Mus. Lud. Utr.* p. 207. n. 26 (1764) (Amer. sept.) ; Houtt., *Naturl. Hist.* i. 11. p. 209. n. 28 (1767) ; Fabr., *Syst. Ent.* p. 451. n. 37 (1775) ; Goeze, *Ent. Beytr.* iii. 1. p. 61. n. 35 (1779) ; Fabr., *Spec. Ins.* ii. p. 15. n. 57 (1781) ; id., *Mant. Ins.* ii. p. 8. n. 63 (1787) ; Gmelin, *Syst. Nat.* i. 5. p. 2241. n. 35 (1790) ; Fabr., *Ent. Syst.* iii. 1. p. 24. n. 70 (1793).

Papilio Eques glaucus, Lange, in Linné, *Syst. Nat.* p. 460. n. 9 (1760).

Papilio Eques antilochus, id., *l.c.* p. 463. n. 28 (1760).

Papilio Eques Achirus anthilochus (!) Linné, *Syst. Nat.* ed. xii. p. 751. n. 35 (1767).

♂. *Papilio Eques Achirus turnus* Linné, *l.c.* (1771) ; Müller, *Naturs. Suppl.* p. 284. n. 496 (1774) ; Fabr., *Syst. Ent.* p. 452. n. 41 (1775) ; Goeze, *Ent. Beytr.* iii. 1. p. 71. n. 5 (1779) ; Fabr., *Spec. Ins.* ii. p. 16. n. 66 (1781) ; id., *Mant. Ins.* ii. p. 9. n. 76 (1787) ; Jabl. & Herbst, *Naturs. Schmett.* iii. p. 136. n. 93. t. 41. fig. 3. 4 (1788) (= *alcidamas*) ; Gmelin, *Syst. Nat.* i. 5. p. 2243. n. 338 (1790) ; Jung, *Alphab. Verz. Schmett.* p. 253 (1792) ; Fabr., *Ent. Syst.* iii. 1. p. 29. n. 86 (1793) ; Esper, *Austländ. Schmett.* p. 135. n. 88. t. 48. fig. 1 (1797).

Papilio (Troes) glaucus, Müller, *Naturs.* v. 1. p. 568. n. 9 (1774).

Papilio (Achirus) antilochus, id., *l.c.* p. 576. n. 35 (1774) (New York ; "Surinam" errore).

Papilio Eques Achirus alcidamas Cramer, *Pap. Exot.* i. p. 62. t. 28. fig. A. B (1775) ("Jamaica" error loci ; New York, Carolina) ; Goeze, *Ent. Beytr.* iii. 1. p. 77. n. 27 (1779) ; Stoll, in Cramer, *l.c.* iv., *Ordre Syst.* p. 3. n. 3 (1782) (= *turnus* = *antilochus*).

Papilio (anthilochus), Meerburgh, *Afb. Zeldz. Gew.* t. 40 (1775).

- Papilio glaucus*, Palisot, *Ins. Afr. Amer.* p. 99. *Lép.* t. 1. b. fig. a. b. ♀ (1805-21); Godart, *Enc. Méth.* ix. p. 60. n. 96 (1819) (N. Amer.; "Jamaica" false); Boisd. & Lec., *Hist. Gén. Lép. Amér. Sept.* p. 22. t. 8. 9. ♀, larva, pupa (1833) (Georgia; Virginia); Boisd., *Spec. Gén. Lép.* i. p. 335. n. 177 (1836) (Georgia; Virginia; Carolina; "Jamaica" false); Doubl., in Westw., *Arc. Ent.* i. p. 143 (1845); Lucas, in Cheun, *Enc. Hist. Nat., Pap.* 1. p. 38. t. 10. fig. 1. ♀ (1851-53); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 3. n. 32 (1857); Gosse, *Letters from Alabama* p. 122 (1859); Vollenh., *Tijdschr. Ent.* iii. p. 85. n. 128 (1860); Morris, *l.c.* n. 2 (1860); Scudd., *Canad. Ent.* iv. p. 74 (1872) (Abbot's MSS. in Brit. Mus.); id., *Rept. Geol. N. Hampsh.* i. t. A. fig. 16 (1874); Auriv., *K. Sr. Vet. Ak. Handl.* xix. 5. p. 14. n. 9 (1882) (reconsio critica); Smyth, *Ent. News* vi. p. 244 (1895) (Montgomery Co., Virginia; this the only ♀ form of *turnus* I have seen here); Dyar, *Bull. U.S. Nat. Mus.* lii. p. 2. n. 11 (1902) (*partim*; Atlantic States); Laur., *Ent. News* xvi. p. 312 (1905) (♀, "large admixture of yellow").
- Papilio turnus*, Palisot, *l.c.* p. 119. *Lép.* t. 2. b. fig. 1. ♂ (1805-21); Godart, *l.c.* ix. p. 55. n. 87 (1819); Say, *Amer. Ent.* iii. p. 86. t. 40 (1828); Boisd. & Lee., *l.c.* p. 19. t. 6. fig. 1. t. 7. fig. 1-3 (1833); Lucas, *Lép. Exot.* p. 35. t. 18. fig. 2 (1835); Boisd., *Spec. Gén. Lép.* i. p. 338. n. 179 (1836); Harris, *Entom.* i. p. 61 (1840) (larva solitary, covers leaf with coating of silk and binds up the sides to form a kind of trough); Doubl., in Westw., *Arc. Ent.* i. p. 143 (1845); id., *List Lep. Ins. Brit. Mus.* i. p. 16 (1845); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 24. n. 112 (1852); Eamm., *Agric. N. York* v. p. 201. t. 38. fig. 3 (1854); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 32. n. 119 (1856); Fitch, *Rept. Ins. N. York* iii. p. 341 (1856); Durban, *Can. Nat. Geol.* ii. p. 223. fig. c. d. t. 3. fig. 1 (1857) (larva, pupa); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 2. n. 31 (1857); Gosse, *Letters from Alabama* p. 202 (1859); Morris, *Syn. Lep. N. Amer.* p. 2. n. 1 (1830); Vollenh., *Tijdschr. Ent.* iii. p. 85. n. 129 (1860) (Indiana; Tennessee); Durban, *l.c.* v. p. 87 (1860); Newm., *Proc. Ent. Soc. Philad.* i. p. 26 (1861) (N. Jersey; on tulip-puplar); Stanf., *ibid.* i. p. 265 (1862) (larvae of *glaucus* and *turnus* different!—They were found on different food-plants); Rid., *ibid.* i. p. 266 (1862) (*glaucus* is ♀ of *turnus*, as found by Dyson already in 1843); Walsh, *ibid.* p. 349 (1863) (in southern Illinois all ♀ ♀ black in summer 1861, on Atlantic coast all ♀ ♀ black perhaps up to 36° lat., in Mississippi valley up to 38°, north of 41° on Atlantic coast, and 43° in Mississippi valley perhaps all yellow); Harr., ed. Flint, *Ins. Inj. Veg.* p. 268. fig. 97. ♀, 98. 1. (1862) (life history); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 148 (1863); Lintn., *ibid.* iii. p. 50 (1864) (Eastern N. York, larva, descr. of pupa; ♀-f. *glaucus* not occurring); Kirkp., *ibid.* iii. p. 329 (1864) (Cleveland, Ohio, common, ♀-f. *glaucus* does not occur); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 314. n. 351 (1864) (*partim*; "Jamaica" false); Tenney, *Nan. Zool.* fig. 281. 282 (1867); Reak., *Proc. Ent. Soc. Philad.* vi. p. 124 (1867) (Pike's Peak, Colo.; also aberr.); Edw., *Trans. Amer. Ent. Soc.* ii. p. 207 (1868) (♀ one side yellow, the other black; aberr. ♀ ♀ mottled with black); Butler, *Cat. Diurn. Lep. descr. Fabric.* p. 248. n. 49 (1869); Riley, *Amer. Entom.* i. p. 99 (1869); Harris, ed. Flint, *Ent. Corresp.* p. 270 (1869); Parker, *Amer. Entom.* ii. p. 175 (1870) (Iowa); Morris, *Psyche* i. p. 35 (1874) (White Mts.); Scudd., *Canad. Ent.* iv. p. 84 (1874) (Abbot's MSS. in Brit. Mus.); Bean, *Ent. Mo. Mag.* x. p. 248 (1874) (Galena, Ill., scarce, sometimes not uncommon in June); Pagenst., *Verh. Nat. Med. Ver. Heidelb.* (2). i. p. 101 (1874); Mead, in Wheeler, *Rept. Expt. Surv. v. Zool.* 8. p. 741 (1875) (occas. in Rocky Mts.); Boll., *Tagebl. Ver. Nat. Hamburg.* Beil. 49. p. 176 (1876); Perk., *Rept. Vermont Board Agric.* ii. p. 589 (1876); Bruner, *Canad. Ent.* ix. p. 20 (1877) (Omaha, Nebraska, black ♀ more frequent than yellow; Niohrota R., both ♀ ♀); Edw., *Bull. N. Amer.* ii. *Pap.* t. 3. 4. 5 (1877 and 1884); Pack., *Half-hours* p. 180 (1877); Dury, *Cincinnati Soc. Nat. Hist.* i. p. 12 (1878) (Cinc., abundant); Gerch., *Macro-Lep. N. Amer.* p. 25. n. 448 (1878); Strecker, *Bull. Moths N. Amer.* p. 69. n. 10. (1878) (*partim*); Obertb., *Et. d'Ent.* iv. p. 67. n. 188 (1880) (*partim*); Middl., *Trans. Dept. Agric. Illin.* xviii. p. 74 (1880); Coquill., *ibid.* p. 173 (1880); Skinn., *Proc. Ac. N. Sci. Philad.* p. 239 (1882) (scent-glands of larva); Saund., *Ins. Inj. Fruits* p. 83. fig. 80. 81. 82 (1883); Edw., *Canad. Ent.* xv. p. 169 (1883) (larvae of *turnus* and *rutilus* different); Gruber, *Jena. Zeitschr. Ges. Nat.* xvii. p. 470. t. 7. fig. 9 (1884); id., *Papilio* iv. p. 86. t. 1. f. 7-11 (1884) (transf.); Fern., *Bull. Maine* p. 24. fig. 1. 2 (1884); Edw., *Canad. Ent.* xvi. p. 115 (1884); id., *l.c.* xvii. p. 113 (1885) (larva refused willow); Hoy, *Rept. Ent. Soc. Ontario* xv. p. 12 (1885) (Racine, Wisc.); Merr., *ibid.* (1885) (Central Adirondacks, common, black ♀ ♀ occurring); Fern., *Canad. Ent.* xviii. p. 50 (1886) (aberrant., Maine); Edw., *ibid.* xviii. p. 139 (1886) (food-plants, also willow); Mayn., *Bull. U. S.* p. 51. n. 51. t. 6. fig. 70. 70 A (1886); Morton, *Canad. Ent.* xx. p. 228 (1888) aberrant.; N. Windsor, N.Y.); Riley, *Insect Life* i. p. 161 (1888) (parasite: *Trogus cresarius*); Skinn., *Canad. Ent.* xxi. p. 127 (1889) (Philadelphia, black and yellow ♀ ♀ in about equal numbers; vars. of ♀); Fletcher, *ibid.* xxi.

- p. 201. fig. 9. 11 (1889) (aberrat.; life hist.); Edw., *Bull. U.S. Nat. Mus.* xxxv. p. 11 (1889) (literat. refer. to metam.); Paek., *Fifth Rept. U.S. Ent. Comm.* p. 217. 472. 480. 529. 531. 535. 555. 669 (1890) (food-plants); id., *l.c.* p. 486 (1890) (early stages); Mayn., *Man. N. Amer. Butt.* p. 11. n. 15 (1891) (*partim*); fig. alia subsp.); Fletcher, *Insect Life* v. p. 126 (1892) (parasite of egg: *Trichogramma*); Staley, *Canad. Ent.* xxiv. p. 204 (1892) (Marshall, Missouri, common); Haase, *Untersuch. Mimicry* i. p. 90 (1893); Brodn., *Insect Life* vi. p. 40 (1893) (larva on *Camphora officinalis*); Daggett, *Ent. News* iv. p. 15 (1893) (decoying); Skinn., *ibid.* iv. p. 82 (1893) (N. Carolina); Meeske, *ibid.* iv. p. 117 (1893) (Long I., reared ♀ *glauca*); Jones, *ibid.* iv. p. 190 (1893) (Richmond Co., N.C.); Winkle, *Canad. Ent.* xxv. p. 212 (1893) (black ♂!); Davis, *Journ. N. York Ent. Soc.* i. p. 47 (1893) (Staten I., N.Y., May to Sept.); Beutenm., *Bull. Amer. Mus. N. H.* v. p. 244. t. 2. f. 2. ♂ (1893) (N. York; descr. of l., p., i.); Davis, *Ent. News* v. p. 109 (1894) (Little Rock, Ark.); White, *ibid.* v. p. 175 (1894) (Brooklyn); Weed, *Psyche* vii. p. 130. n. 36 (1894) (N.E. Miss.); Ehrm., *Canad. Ent.* xxvi. p. 292 (1894) (aberrat. of ♀, right forewing yellow, left black); How., *Ins. Life* vii. p. 44. fig. 15. 16 (1894) (melan. ♂; Kansas); Weith, *Ent. News* vi. p. 158 (1895) (Vermont, larva 3 weeks without food before dying); Osburn, *ibid.* vi. p. 282. n. 44 (1895) (Tennessee, common, iv. to ix., two broods; ♀ *glauca* frequently in Aug. & Sept.); Longl., *ibid.* vi. p. 314 (1895) (Chicago); Eimer, *Arb. Verwandtsch. Schmett.* ii. p. 79. t. 5. fig. 1. 2 (1895); Clevel., *Ent. News* vii. p. 73 (1896) (Oneonta, N.Y.); Fiske, *ibid.* vii. p. 241 (1896) (Webster, N.H., common, May, June); Soule, *Psyche* vii. p. 398 (1896) (Brookline, Mass., ovipositing on higher branches of young ash-trees); Truman, *Ent. News* viii. p. 29 (1897) (Volga, S. Dakota); Bubua, *ibid.* viii. p. 98 (1897) (Cleveland, Ohio; scarce this year); Eimer, *Orthogen.* p. 32. fig. 10. ♀ (1897); Christ, *Mitth. Schweiz. Ent. Ges.* ix. p. 276 (1897); Duzee, *Bull. Buffalo Soc. N. Sc.* v. p. 107. n. 5 (1897) (Buffalo, common); Rowley, *Ent. News* ix. p. 37 (1898) (Louisiana, Mo.); Beutenm., *Bull. Amer. Mus. N. H.* x. p. 310 (1898) (Highland Falls, N.Y.); Holland, *Butt. Book* p. 309. n. 4. t. 2. fig. 15. 26. 28. larva, t. 6. fig. 1—4. pupa, t. 43. fig. 1. ♂, 2. ♀ (1899) (*partim*); Denton, *Moths Butt.* ii. p. 335. fig. ♀ (1898—1900); Beutenm., *Butt. N. York City* p. 3. n. 1. fig. ♀ (1902); Macgill. & Hought., *Ent. News* xiv. p. 265 (1903) (Adirondaek Mts.); Comst., *ibid.* xiv. p. 197 (1903) (Adirondaek Mts., very common in June); Briml. & Sherm., *ibid.* xiv. p. 230 (1903) (Raleigh, N.C., also *glauca*, March 31); Heink, *ibid.* xiv. p. 335 (1903) (Meramec Highlands, St. Louis Co., April 12); Paxs., *ibid.* xvi. p. 328 (1905) (colour of larva harmonising with that of leaf).
- Jasoniades turnus*, Hübner, *Verz. bek. Schmett.* p. 83. n. 843 (1818?).
- Euphocades glauca*, id., *l.c.* p. 83. n. 846 (1818); Sprague, *Psyche* ii. p. 257 (1879) (Wollaston, Mass., May 24); id., *l.c.* p. 259 (1879) (Mass., May 25 to July 15); Morse, *Psyche* vii. p. 155 (1894) (Stamford, Conn., Aug. 22); Kirby, in Allen, *Nat. Libr., Butt.* ii. p. 284 (1897); id., in Hübner, *Samm. Erot. Schmett.* ed. ii. p. 99. t. 308. fig. 1. 2 (190—2).
- Papilio antiochus*, Boisduval, *Spec. Gén. Léop.* i. p. 340. n. 180 (1836) (*turnus* with artificial tail); Auriv., *K. Sr. Vet. Ak. Handl.* xix. 5. p. 28. n. 26 (1882) (recensio critica; "spec. fict.").
- Papilio troilus*, Jaeger, *Life N. Amer. Ins.* fig. 53. ♀ (1864).
- Papilio turnus* var. *glauca*, Edwards, *Canad. Ent.* v. p. 9 (1873) (name for the black var. only); Dury, *Cincinnati Soc. Nat. Hist.* i. p. 12 (1878) (Cinc., abundant); Stevens, *Psyche* iv. p. 233 (1885) (Poughkeepsie, N.Y., August); Eimer, *Arb. Verwandtsch. Schmett.* ii. p. 142. t. 8. fig. 1. ♀ (1895); Jehb., *Ent. News* xvi. p. 111 (1905) (dark ♀ produced by diseased food!).
- Papilio turnus* dim. var. ♀ *glauca*, Edwards, *Trans. Amer. Ent. Soc.* vi. p. 11. sub n. 17 (1877) (Southern New York, and Wisconsin to Gulf of Mexico; Kausas to Texas).
- Jasoniades glauca*, Scudder, *Butt. East. U.S.* ii. p. 1288. t. 8. fig. 1, t. 13. fig. 10, t. 26. fig. 8, t. 35. fig. 31—34, t. 40. fig. 10, t. 57. fig. 4, t. 61. fig. 13, t. 66. fig. 1, t. 68. fig. 18, t. 76. fig. 15. 26. 28, t. 80. fig. 7—10, t. 85. fig. 1—4 (1889) (morph., metam., habits, etc.); id., *Psyche* viii. p. 208. t. 5. f. 3, l. juv. (1898).
- Papilio turnus* dim. form. *glauca*, Edwards, *Bull. U.S. Nat. Mus.* xxxv. p. 11 (1889) (liter. relat. to metamorphosis).
- Papilio turnus glauca*, Skinner, *Ent. News* iv. p. 82 (1893) (N. Carolina); Jones, *ibid.* iv. p. 190 (1893) (Richmond Co., N.C.); Bubua, *ibid.* viii. p. 98 (1897) (Cleveland, Ohio; three specimens); Eimer, *Orthogen.* p. 37. fig. 19. ♀ (1897).
- Papilio turnus* ab. *fletcheri* Kemp, *Ent. News* xi. p. 481 (1900) (N. Jersey).
- Papilio turnus* ♀ *glauca*, Grote, *Canad. Ent.* xxxiv. p. 94 (1902) (♀ *glauca* represents the original colour of the insect!; *P. turnus* allied to *troilus*).
- Papilio turnus australis* Maynard, *Man. N. Amer. Butt.* p. 215. n. 15a (1891) (Florida).
- Papilio glauca turnus*, Dyar, *l.c.* lii. p. 2. sub n. 11 (1902).
- Papilio glauca australis*, id., *l.c.*

♂. Submarginal buff spots of underside of forewing separate, but in small spring specimens more or less continuous. Black abdominal border of hindwing narrower than the yellow interspace between it and the cell.

The third black band of the forewing, above, varies from being restricted to the cell to being extended a little beyond M^2 , in most specimens not quite reaching M^2 . The band situated on or beyond the cross-veins bears occasionally several yellow spots. The first submarginal spot is rarely absent from the upperside. The black markings of the upperside are occasionally so much extended as to occupy the greater part of the wing. The melanism of these males, of which several have been described, is not the same as that of the females, in the black female the ground-colour having assumed a blackish or brown tint, the bands remaining normal, while in these black males the bands are extended.

♀. The form resembling the male is the ordinary one in the northern districts of the range, while in the southern districts the dark form is the more frequent of the two. Intermediate specimens are comparatively rare. Specimens have been recorded in which the left side resembles the one female, while the right side resembles the other.

We have four females which are intermediate between the two female forms. In one of them (New Jersey, July 1898), a black female, the postdiscal area of the hindwing is more or less ochraceous in posterior half of wing, both above and below. The second black female (Staten Island, August 1901) has traces of the yellow ground-colour on both wings, especially on the underside. The third specimen (Jefferson Co., Kentucky, September 1897, C. R. Troxler, senr.) is much more extended yellow than the second, especially on the disc of the hindwing. The fourth female has the yellow parts merely shaded with black (Baltimore, August 1894). The two forms of the female may conveniently be referred to as ♀-*f. glaucus* and ♀-*f. turnus*.

Hab. Atlantic district, from Florida to New England, westward to the Mississippi basin.

In the Tring Museum 100 ♂♂, 32 ♀♀, and some larvae and pupae from : Texas; Florida; Carolina; Georgia; Tennessee; Kentucky; Staten I.; New Jersey; Buffalo; Illinois.

b. P. glaucus canadensis subspec. nov.

Papilio turnus, Kirby (non Linné, 1771, err. det.), *Fauna Bor. Amer.* iv. p. 286. n. 401 (1837) (Canada); Gosse, *Canad. Natur.* p. 183. fig. (1840); id., *l.c.* p. 194. 223. 293 (1840) (habits); Felder, *l.c.* (1864) (*partim*); Reed, *Canad. Ent.* i. p. 19 (1868) (London, Ont.); Saund., *ibid.* i. p. 22. 74 (1869) (London, Ont.; early stages; imago in May and later, perhaps two broods); Beth., *ibid.* ii. p. 8 (1869) (Toronto, July); Riley, *ibid.* iv. p. 37 (1872) (Peterboro Co., Ont., May); Grote, *Bull. Buffalo Soc. Nat. Sci.* i. p. 185 (1873) (Anticosti; small); Saund., *Canad. Ent.* vi. p. 2. fig. 1 (1874); id., *l.c.* p. 140 (1874) (Essex Co.); Lym., *ibid.* p. 158 (1874); Saund., *Rept. Ent. Soc. Ontario* p. 20. fig. 13. 14 (1874) (life hist.); Bates, *Ent. Mo. Mag.* xi. p. 244 (1875) (Newfoundland; small, pale, with narrow black border to hindwing); Edw., *Bull. N. Amer.* ii. *Pap.* t. 5. fig. 1. ♂ (1877); Beth., *Canad. Ent.* x. p. 217 (1878) (Canada); Saund., *Rept. Ent. Soc. Ontario* p. 73. fig. 40. 41 (1880); Fletcher, *ibid.* p. 62. fig. 45 (1881); Gosse, *Canad. Ent.* xv. p. 48 (1883) (Newfoundland); Saund., *ibid.* p. 204 (1883) (larva on *Magnolia acuminata*, exceptional); id., *Rept. Ent. Soc. Ontario* p. 16 (1884) (larva on *Magnolia*); Fyles, *ibid.* p. 63. fig. 32 (1884); id., *ibid.* p. 44 (1889) (on apple, etc.); Moffat, *ibid.* p. 101 (1899) (London, Ont.); Fletcher, *ibid.* p. 79. 83 (1889) (Nepigon, L. Superior; eggs laid on aspen, early in July); Mayn., *Man. N. Amer. Butt.* p. 11. n. 15. t. 1. fig. 1. ♂ (1891) (*partim*); Fletcher, *Rept. Ent. Soc. Ontario* xx. p. 38. fig. 12. 13. 14 (1890) (life hist., melanic ♂); Fyles, *ibid.* xxiv. p. 39. fig. 19 (1894) (Quebec, larva on *Amelanchier canadensis*); Danby, *Journ. N. York Ent. Soc.* ii. p. 33 (1894) (Vancouver I., common); Grant, *Canad. Ent.* xxviii. p. 273.

fig. 23. aberr. (1896) (Orillia, Ont., usually common, v. vi. vii.); Holland, *Butt. Book* p. 309 n. 4 (1899) (*partim*; Sitka; Canada); Lyman, *Canad. Ent.* xxxii. p. 119 (1900) (Dawson, Yukon); Bethune, *Rept. Ent. Soc. Ontario* xxx. p. 101 (1900) (parasites; *Trogus fulvipes* rare, *T. exesorius* common); id., *l.c.* p. 104 (1900) (first specim. of *turnus* May 28); Dod, *Canad. Ent.* xxxiii. p. 171. n. 81 (1901) (Alberta, June, fairly common); Moffat, *Rept. Ent. Soc. Ontario* xxxii. p. 51. fig. 30 (1902) (middle of May to middle of Aug. this year); Gibson, *ibid.* xxxiii. p. 76. fig. 53 (1903) (larva); Dyar, *Proc. U. S. Nat. Mus.* xxvii. p. 782 (1904) (Kootenai).
Papilio thoas, Heust. (*non* Linné, 1771, err. det.), *Canad. Ent.* xi. p. 239 (1879) (St. John's, N.B.).
Papilio glaucus, Linn., var. *turnus*, Linn., Weir, *Entom.* xiv. p. 99 (1881) (Hudson Bay, July).
Papilio glaucus, Dyar, *Bull. U.S. Nat. Mus.* lii. p. 2. n. 11 (1902) (*partim*; Canada; Alaska).
Papilio glaucus L. a. *turnus*, Cockerell, *Rept. Ent. Soc. Ontario* xxxiv. p. 90 (1904) (Kaslo, B.C.).

♂ ♀. A small form. On the *upper side* the third band (from base) of the forewing reaches nearly always down to M² in male, to SM² in female; marginal spots thinner and longer than in *P. glaucus glaucus*.—The black abdominal border of the hindwing broader than the yellow interspace between it and the cell.

On the *underside* the submarginal spots of the forewing form a continuous band, only the last one or two spots being separated.—The abdominal border of the hindwing as broad as above; submarginal spots on the whole less curved than in *P. g. glaucus*; the blue spots larger, and the black proximal borders to them on the whole more straight.

Hab. Newfoundland; Anticosti; New Brunswick; Canada; northern districts of British Columbia; Alaska; name-type from Newfoundland.

In the Tring Museum 80 ♂♂, 2 ♀♀, from: Newfoundland, June 1898; Baie St. Claire, Anticosti; Rainy Lake, June 1892 (Daggett); Ottawa; Didsbury, Alberta, June 1904; British Columbia.

80. *Papilio rutulus* Lucas (1852).

Papilio rutulus Lineas, in Guér., *Rev. Zool.* (2). iv. p. 158 (1852) (March; California); Boisduval, *Ann. Soc. Ent. France* p. 279. n. 1 (1852) (California); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* ii. p. 529 (1852) ("*rutulus* Lucas"; Boisduval not mentioned, his description being of a later date); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 24. n. 111 (1852) ("var." excl.); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 32. n. 118 (1856) ("var." excl.); Morris, *Syn. Lep. N. Amer.* p. 3. n. 3 (1862); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 148 (1863); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 314. n. 350 (1864) (California; Sonora); Behr, *Stett. Ent. Zeit.* xxii. p. 215 (1866) (Calif.); Reak., *Proc. Ent. Soc. Philad.* vi. p. 125 (1867) (Pike's Peak, Colo.; diff. from *turnus* and *dunus*); Kirby, *Cat. Diurn. Lep.* p. 565. n. 315 (1871) ("var." excl.); H. Edw., *Proc. Cal. Ac. Sc.* v. p. 165 (1873) (chrysalis); Mead, in Wheeler, *Rept. Expl. Surv. v. Zool.* 8. p. 741 (1875) (S. Utah; Colorado, June, one brood only); Edw., *Trans. Amer. Ent. Soc.* vi. p. 11. n. 16 (1877) (Pacific States; Rocky Mts.); Gerh., *Macro-Lep. N. Amer.* p. 25. n. 445 (1878); Strecker, *Butt. Mollis N. Amer.* p. 70. n. 11 (1878) (Calif.; Oregon, etc.); Edw., *Papilio* ii. p. 112 (1882) (early stages); Hagen, *ibid.* ii. p. 160 (1882) (character and distrib.; "*Kamschatka loci error*"); id., *Psyche* iii. p. 415 (1882) (Washington Terr., western form and *turnus* eastern form; *rutulus* found as far east as Salt Lake, Utah, and Fort Bridger, Wyo.); Edw., *Papilio* iii. p. 4 (1883) (dist. spec.); id., *Canad. Ent.* xv. p. 169 (1883) (larva diff. from that of *turnus*); Buil., *Journ. Linn. Soc. Lond.* xvi. p. 472. n. 60a (1883) (Lake and Tehama Cos.); Behr, *Bull. Cal. Ac. Sc.* I. p. 64 (1884) (Calif. common; l. on *Amygdalaceae*); Edw., *Butt. N. Amer.* ii. *Pap.* t. 12. 13. (1884) (♂ ♀ *metham.*); id., *Canad. Ent.* xvii. p. 112 (1885) (larva on willow); Denton, *ibid.* xxi. p. 111 (1889) (Nevada); Skion., *ibid.* xxi. p. 238 (1889) (Ft. Qu'Appelle, N.W. Terr.); Edw., *Bull. U.S. Nat. Mus.* xxxv. p. 12 (1889) (liter. relat. to metamorph.); Mayn., *Man. N. Amer. Butt.* p. 12. n. 17. fig. 9 b (1891); Pack., *Fifth Rept. U.S. Ent. Comm.* p. 625 (1891) (egg and larval stages); Wright, *Canad. Ent.* xxiv. p. 73 (1892) (how to get eggs from ♀); Haase, *Untersuch. Mimicry* i. p. 89 (1893); Osler, *Ent. News* iv. p. 226 (1893) (Los Angeles, Feb.); Cockerell, *Trans. Amer. Ent. Soc.* xx. p. 353. n. 645 (1893) (Colorado); Sayder, *Ent. News* v. p. 133 (1894) (Park City, Utah); Cunningham, *Ent. News* vi. p. 251 (1895) (Ft. Klamath, Oregon); Twog., *ibid.* viii. p. 31 (1897) (Riverside, Calif., common, Feb. to Oct.); Christ, *Mitth. Schweiz. Ent. Ges.* ix. p. 278 (1897); Holland, *Butt. Book* p. 309.

n. 3. t. 45. fig. 1 ♂ (1899) ; Denton, *Moths Butt. U.S.A.* ii. p. 337. fig. (1898—1900) ; Brown, *Ent. News* xii. p. 301 (1901) (Salt Lake City, common) ; Dyar, *Bull. U.S. Nat. Mus.* lii. p. 2. n. 10 (1902) (Pacific States, Rocky Mts.) ; id., *Proc. U.S. Nat. Mus.* xxvii. p. 782 (1904) (Kootenai ; larva on birch, etc.) ; Wright, *Butt. West Coast* ed. ii. p. 84. n. 19. t. 3. fig. 19 (1906) (lowland species).

Papilio rutulus, var. or ab. ♀, Strecker, *Lep. Rhop. Hrt.* p. 128 (1877) (Arizona).

Papilio turnus var. (geogr.) *rutulus*, Oherthür, *Et. d'Ent.* iv. p. 68. sub n. 188 (1880).

Papilio rutulus var. *arizonensis* Edwards, *Papilio* iii. p. 4 (1883) (Arizona) ; id., *Butt. N. Amer.* ii.

Pap. t. 13. ♂ ♀ (1884) ; Winkle, *Canad. Ent.* xxv. p. 212 (1893).

Papilio turnus, Butler, *Journ. Linn. Soc. Lond.* xvi. p. 472. n. 61 (1883) (Tehama and Mendocino Co.).

Papilio rutulus var. *ammoni* Behrens, *Canad. Ent.* xix. p. 199 (1887) (orange colour) ; Winkle, *l.c.* xxv. p. 212 (1893).

Papilio nitulus (1), Cockerell, *Trans. Amer. Ent. Soc.* xx. p. 353 (1893) (*lays. cal.*).

Papilio turnus rutulus, Eimer, *Arb. Vervandtch. Schmett.* p. 83 (1895).

Papilio rutulus arizonensis, Maynard, *Min. N. Amer. Butt.* p. 13. n. 17a. fig. 10a (1891) (Arizona ;

New Mexico ; Colorado) ; Dyar, *Bull. U.S. Nat. Mus.* lii. p. 2. sub n. 10 (1902).

Papilio rutulus ammoni, Maynard, *l.c.* (Nevada) ; Dyar, *l.c.*

Papilio arizonensis, Wright, *Butt. West Coast* ed. ii. p. 85. n. 20. t. 3. fig. 20 (1906) (S. Arizona).

Papilio ammoni, id., *l.c.* n. 21 (1906) ("not seen").

♂ ♀. Sexes similar. Forewing on the whole rather more pointed than in *P. glaucus*, the subapical σ -mark rarely centred with yellow, or at least the yellow colour within the mark rarely so extended as to leave only the edges of the spot pure black, the σ -mark proximally often separate from SC^1 , the proximal portion being often almost isolated, especially on underside ; first submarginal spot linear like the others, usually larger than the second ; the subbasal yellow band less narrowed costally than in *P. glaucus*, the third black band on the whole longer than in specimens of *P. glaucus* of the same size, reaching usually beyond M^2 ; yellow fringe-spots very thin.—Black abdominal border of hindwing always wider than the yellow interspace between it and cell ; first submarginal spot small or absent, seldom nearly as large as the second, never orange in either sex.

The buff submarginal spots of the *underside* of the forewing merged together to a continuous line.—No orange patches on disc of hindwing, or only traces of them ; submarginal spots less orange than in *P. glaucus*, usually only the last two being of this colour.

We do not find any fairly constant differences between specimens from Arizona and California.

Early stages see Wright, *l.c.*

Genitalia : ♂. Harpe truncate, apex not produced beyond base of process ; dorsal hook longer than in *P. glaucus*, simple, non-dentate, there being never two hooks, as is always the case in *P. glaucus*.—♀. Antevaginal process obtuse ; lateral dentate flaps larger than in *P. glaucus*, extending farther frontad than in that species.

Hab. British Columbia to Arizona.

One of our specimens from the Frazer R. (June 1901) is worthy of being specially mentioned. The upper submarginal spots on the upperside of the forewing are rounded, being connected with the margin by means of dispersed yellow scales. The submarginal spots of the underside of both wings are extended to the margin, forming a nearly continuous marginal band, a very little of the black marginal line being left at the apex of most veins.

In the Tring Museum 270 ♂♂, 46 ♀♀, from : Senator, Arizona, July 1898 (Dr. Kunze) ; South Park, August 1901, Chimney Gulch, June 1900, Grand Junction, July 1901, Colorado (Osler) ; Garfield Co. ; Reno, Nevada ; North Tulare R.,

California, July 1897 (Purpus); McClouf R., Shasta, June 1884 (O. T. Baron); Siskiyou Co. (O. T. Baron); Hoopa valley, July 1896 (Dougherty); Quincy, California, 3400 ft., June and July 1897 (Watson); Davis Creek, Modoc Co., June 1898 (Mrs. Austin); Butte Creek, Butte Co., April 1898 (Mrs. Austin); Pine Creek, Oregon, June 1898 (Mrs. Austin); San Reno, California, June 1897; Sonora (Lorquin; coll. Felder); Gold Hill, Oregon, June and July 1901 (Biedermann); Nicomin I., Frazer R., May and June 1900; Qu'Appelle, Assiniboia, June 1901; Vancouver (A. H. Bush); Ozoyoos (Raynolds).

81. *Papilio daunus* Boisd. (1836).

Papilio daunus Boisduval, *Spec. Gén. Lép.* i. p. 342. n. 182 (1836) (Mexico); Doubl., *List Lép. Ins. Brit. Mus.* i. p. 16 (1845) (Oajaca); id., Westw. & Hew., *Gen. Diurn. Lép.* i. p. 13. n. 88 (1846); Gray, *Cat. Lép. Ins. Brit. Mus.* i. *Pap.* p. 24. n. 109 (1852); id., *List Lép. Ins. Brit. Mus.* i. *Pap.* p. 32. n. 116 (1856) (Oajaca); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 2. n. 30 (1857) (Mexico); Vollenh., *Tijdschr. Ent.* iii. p. 85. n. 131 (1860) (Mexico); Rid., *Proc. Ent. Soc. Philad.* i. p. 278. fig. 2 (1862) (Kansas); Felder, *Verh. Zool. Bot. Ges. Wien.* xiv. p. 313. n. 346 (1864); Reak., *Proc. Ent. Soc. Philad.* vi. p. 124 (1867) (Colorado); Kirby, *Cat. Diurn. Lép.* p. 564. n. 312 (1871); Strecker, *Lép. Rhop. Met.* p. 45. t. 6. fig. 1. ♂, 2. ♀ (1873) (Rocky Mts.; Vera Cruz); H. Edw., *Proc. Cal. Ac. Sc.* v. p. 325 (1874) (pupa, larva noticed); id., *Bull. N. Amer.* ii. *Pap.* t. 2. ♂ (1875); Mead, in Wheeler, *Rept. Expl. Surv.* v. *Zool.* 8. p. 741 (1875) (Colorado, S. Utah); Kirby, *l.c.* p. 811 (1877); Edw., *Trans. Amer. Ent. Soc.* vi. p. 11. n. 18 (1877) (Arizona to Montana; Oregon); Uhler, in Hayd., *Bull. U.S. Geol. Geogr. Surv.* iii. p. 356 (1877) (Clear Creek, Colo.); id., *l.c.* p. 765 (1877) (Clear Creek and Ute Pass, Aug. 6—13); Gerh., *Macro-Lép. N. Amer.* p. 25. n. 446 (1878); Strecker, *Bull. Moths N. Amer.* p. 68 (1878) (Colorado; N. Mexico; Mexico; Central America); Oberth., *Et. d'Ent.* iv. p. 68. n. 191 (1880) (Mexico; type); Hagen, *Psyche* iii. p. 415 (1882) (probably the same as *rutulus*); id., *Papilio* ii. p. 163 (1882) (doubtfully distinct from *rutulus*); Edw., *ibid.* iii. p. 2. (1883) (Arizona, larva & pupa; Boulder, Colo.); id., *l.c.* iii. p. 158 (1883) (Montana); id., *Bull. N. Amer.* ii. *Suppl.* p. 1 (1884) (larva); Schaus, *ibid.* iv. p. 100 (1884) (adult larva descr.); Behr, *Bull. Cal. Ac. Sc.* I. p. 64 (1884) (Calif., local, 1. on *Prionus demissa*); Denton, *Canad. Ent.* xxi. p. 111 (1889) (Nevada); Edw., *Bull. U.S. Nat. Mus.* xxxv. p. 12 (1889) (liter. relat. to metam.); Mayn., *Man. N. Amer. Butt.* p. 13. n. 18. fig. 9. ♂ (1891) (Arizona to Montana; Utah; Nevada; Oregon; Mexico); Godm. & Salv., *Biol. Centr. Amer., Lép. Rhop.* ii. p. 240. n. 78. t. 70. fig. 9. genit. (1893) (Oregon and Montana southward to Guatemala; open grassy tracts in the highlands); Haase, *Untersuch. Mimicry* i. p. 89. fig. 9 (1893); Snyder, *Ent. News* v. p. 166 (1894) (Park City, Utah, larva, eggs); Eimer, *Artb. Verwandtsch. Schmett.* p. 87. t. 5. fig. 6. ♂, 7. ♀ (1895); Christ, *Mitth. Schweiz. Ent. Ges.* ix. p. 278 (1897); Eimer, *Orthogen.* p. 30. fig. 8 (1897); Edwards, *Bull. N. Amer.* iii. *Suppl.* p. 1 (1897) (larva); Holland, *Bull. Book* p. 310. t. 38. fig. 2. ♂ (1899) (eastern valleys of Rocky Mts., Arizona, Mexico); Denton, *Moths Butt. U.S.A.* ii. p. 338. fig. (1898—1900) (Colorado; New Mexico; Mexico; occas. in Kansas and Texas); Brown, *Ent. News* xii. p. 301 (1901) (Salt Lake City, common. June, up to 7000 ft.); Dyar, *Bull. U.S. Nat. Mus.* lii. p. 2. n. 8 (1902) (Rocky Mts.); Hoag, *Ent. News* xiv. p. 321 (1903) (S. Luis Potosi, Mex.); Honeyman, *Rept. Ent. Soc. Ontario* xxxv. p. 61. n. 8 (1904) (Regina); Wright, *Bull. West Coast* ed. ii. p. 82. n. 16. t. 3. fig. 16 (1906) (rapid flight; food plants).

Papilio multicaudatus Kirby (ex Peale, ined.), *Papilio* iv. p. 104 (1884) (= *daunus*).

♂ ♀. Sexes similar, the black bands and blue spots being larger in the female than in the male. The hindwing is as a rule much more strongly dentate than in the allied species, the tail being very long and tooth M¹ being prolonged to a second tail. However, sometimes the dentition is hardly more prominent than in *P. rutulus*. The black bands are always narrower than in *P. rutulus*; the S-shaped subapical mark of the forewing is always centred with yellow; the fourth black band is narrower than the yellow apical cell-space; second black band seldom as broad as the yellow cell-space situated at its distal side; the third band in the male often stopping short at the median vein, while in some other males

and in almost all females it reaches to near SM^2 ; the fifth band also very variable in length.—The median band of the hindwing is often very thin, sometimes vestigial; the black abdominal border is narrower than in *P. rutulus*, while the distal border is usually broader. The ground-colour becomes deep yellow (also in the allied species) in consequence of exposure to light and damp.

In many specimens there are large orange patches on the *underside* of the hindwing, the disc being sometimes washed with orange at the black distal border also on the upperside.

Mexican specimens are on the whole larger than those from Oregon, Washington, and British Columbia, the females especially being often very large. However, we cannot find any fairly constant character by which to distinguish northern and southern specimens, the species being strongly variable individually in all districts.

Genitalia: ♂. Harpe broad, either truncate, or the dorsal edge slanting down to the base of the process; this edge with two or more teeth; one dorsal hook, usually bearing a few teeth.—♀. Antevaginal lobe triangular; lateral ridge very large, strongly dentate.

For early stages see Edwards, Wright, etc.

Hab. British Columbia and Alberta southwards to Guatemala, eastwards to Colorado and Vera Cruz.

In the Tring Museum 170 ♂♂, 65 ♀♀, from: Ozoymos, British Columbia (Raynolds); Gold Hill, Oregon, July 1901 (Biedermann); Modoc Co., July 1897, and Butte Co., April 1898 (Mrs. Austin); Verdi, Nevada, 7000 ft., June 1896; McCloud R., Shasta, June 1884 (O. T. Baron); Siskiyou Co. (O. T. Baron); Tuckee, California, 6000 ft.; North Tulare R., California, July 1897 (Purpus); Quincy, California, June (Watson); Prescott and Senator, Arizona, June, July and August (Dr. Kunze); Verde R., Copper Basin, Thumb Butte and Huachuca Mts., Arizona, July—September 1903 (Oslar); Denver, Colorado (Mason); Grand Junction, South Park and Chimney Gulch, Colorado, June—August 1900 and 1901 (Oslar); Las Vigas, May 1896, Jalapa, July 1896, Cholula, March 1896, Orizaba, March 1896 (W. Schaus); Oaxaca, July 1896 (W. Schaus); Gnadalahajara, August 1896 (W. Schaus); Cuernavaca, 4000 ft., July 1904 (A. Hall); Guerrero (O. T. Baron); Salvatierra, Guanajuato.

82. *Papilio eurymedon* Lucas (1852).

Papilio eurymedon Lucas, in Guérin, *Rev. Zool.* (2). iv. p. 140 (1852, March) (California); Boisd., *Ann. Soc. Ent. France* p. 280. n. 2 (1852) (California); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* ii. p. 529 (1852) (quote "*eurymedon* Lucas," not mentioning Boisd., whose description came out later); Morrís, *Syn. Lep. N. Amer.* p. 4. n. 4 (1862); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863); Behr., *Stett. Ent. Zeit.* xxvii. p. 215 (1866) (Calif.); Reak., *Proc. Ent. Soc. Philad.* vi. p. 126 (1867) (Pike's Peak, Colo.; Washington Terr.); Kirby, *Cat. Diurn. Lep.* p. 565. n. 314 (1871); Strecker, *Lep. Rhop. Hel.* p. 25. t. 4. fig. 1 (1873) (California); Washington; Vancouver I.); H. Edw., *Proc. Cal. Ac. Sc.* v. p. 164 (1873) (larva, pupa); Edw., *Bull. N. Amer.* ii. *Pap.* t. 1 (1874) (metam.); Mead, in Wheeler, *Rept. Expl. Surv.* v. *Zool.* 8. p. 742 (1875) (Colorado); Edw., *Trans. Amer. Ent. Soc.* vi. p. 11. n. 15 (1877) (Calif. to Brit. Col.; Arizona to Montana); Gerh., *Macro-Lep. N. Am.* p. 25. n. 444 (1878); Strecker, *Bull. Moths N. Am.* p. 70. n. 12 (1878) (Calif.; Oregon; Vancouver I.); Oberth., *Et. d'Ent.* iv. p. 68. n. 189 (1880); Edw., *Papilio* iii. p. 158 (1883) (Montana); Behr., *Bull. Cal. Ac. Sc.* i. p. 64 (1884) (Calif., common, l. on *Rhannus californica*); Denton, *Canad. Ent.* xxi. p. 111 (1889) (Nevada); Edw., *Bull. U.S. Nat. Mus.* xxxv. p. 12 (1889) (literat. rel. to metamorphosis); Mayn., *Man. N. Amer. Butt.* p. 12. n. 16 (1891); Haase, *Untersuch. Mimicry* i. p. 89 (1893); Dyar, *Ent. News* iv. p. 243 (1893) (life history; on *Rhannus californica*); Cunningham, *ibid.* vi. p. 251 (1895) (Ft. Klamath, Oregon); Eimer, *Arth. Verwandtsch. Schmett.* ii. p. 90. t. 5. fig. 5

- (1895) (California); id., *Orthogen*, p. 28. fig. 2 (1897); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 278 (1897); Twog., *Ent. News* viii. p. 31 (1897) (Riverside, Calif., one ex., Aug.); Holland, *Butt. Book* p. 308. n. 2. t. 44. fig. 5. ♂ (1899) (Mexico to Alaska, eastwards to Colorado); Denton, *Moths Butt. U.S.A.* ii. p. 340 (1898—1900); Brown, *Ent. News* xii. p. 301 (1901) (Salt Lake City, common from 4500 to 6000 ft.); Dyar, *Bull. U.S. Nat. Mus.* lii. p. 2. n. 9 (1902) (Pacific States; Colorado); id., *Proc. U.S. Nat. Mus.* xxvii. p. 782 (1904) (Kootenai, June, larva on *Ceanothus*); Wright, *Butt. West Coast* ed. ii. p. 83. t. 3. fig. 17 (1906) (mountain species, up to 8000 ft.).
- Papilio rutulus* var. a. *Papilio eurymedon* Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 24. sub n. 111 (1852) (California); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 32. sub n. 118 (1856).
- Papilio rutulus* var. *eurymedon*, Vollenhoven, *Tijdschr. Ent.* iii. p. 85. n. 133 (1860).
- Papilio eurymedon* (!), Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 313. n. 348 (1864).
- Papilio albanus* Felder, *l.c.* xiv. p. 314. n. 349 (1864) (nom. indescr.; California); id., *Reise Novara, Lep.* p. 93. n. 71. (1865); Edw., *Papilio* ii. p. 122 (1882) (♂♂ in the mountains or at 2000 ft. are nearly always this form); Butler, *Journ. Linn. Soc. Lond.* xvi. p. 472. n. 60 (1883) (= ? *eurymedon*; Mendocino); Wright, *Butt. West Coast* ed. ii. p. 84. n. 18 (1906) (characters do not hold good).
- Papilio rutulus* var. a. *P. albanus*, Kirby, *Cat. Diurn. Lep.* p. 565. sub n. 315 (1871).
- Papilio lewisi* Kirby (ex Peale, ined.), *Papilio* iv. p. 104 (1884) (= *eurymedon*).
- Papilio eurymedon* var. *albanus*, Winkle, *Canad. Ent.* xxv. p. 212 (1893).
- Papilio rutulus*, Danby, *Journ. N. York Ent. Soc.* ii. p. 33 (1894) (Vancouver I., common; = *eurymedon*, as stated on p. 141).
- Papilio eurymedon albanus*, Dyar, *l.c.* (1902).

♂♀. The black bands on both sides of the wings much heavier than in either *P. rutulus* or *daunus*, but their width very variable. At higher altitudes there occur often specimens in which the black distal marginal border is much reduced, being about the same width on the forewing between R² and M² as the yellowish white discal band. This is Felder's *P. albanus*, *l.c.*, which may nomenclatorially be distinguished from the ordinary form as—

f. mont. *albanus* Feld. (1865).

Besides two specimens from Felder's collection we have this form from Colorado and California.

The costal ω -mark of the forewing is not centred with creamy buff in *P. eurymedon* either above or below; the submarginal spots of the forewing above are more or less linear; the powdery buffish line on the black postdiscal band of the underside of the forewing is narrow or absent. In Colorado specimens the black bands are on the whole a little narrower than in Californian ones.

Genitalia: ♂. Harpe dorsally less elevate in the allied species, the hook being shorter, bearing usually a few teeth, there being generally no other prominent teeth at the oblique dorsal edge of the harpe; but this edge occasionally minutely denticulate, the ventral edge being also often provided with one or two teeth; apex of harpe as in *P. rutulus*, not produced, the process standing at the ventral apical corner.—♀. Antevaginal process pointed, lateral flaps rather larger than in *P. rutulus*.

For early stages see Dyar, *l.c.* (1893).

Hab. British Columbia to Southern California and Colorado.

Holland, in *Butt. Book*, records it from Alaska and Mexico, which requires confirmation.

In the Tring Museum 180 ♂♂, 32 ♀♀, from: Glenwood Springs and Chimney Gulch, Colorado, June 1900 and 1901 (Oslar); Mendocino, California, August (O. T. Baron); McCloud R., Shasta, June 1884 (O. T. Baron); Quincy, California, May, June and July 1897 (Watson); Butte Co., Lake Co., and Modoc Co., June

and July 1897 and 1898 (Mrs. Austin); Hoopa Valley, July 1896 (Dongherty); Gold Hill, Oregon (Biedermann); Ozooyoos, British Columbia (Raynolds); Nicomiu I., Frazer R., May and June 1900; Kaslo; New Westminster (A. D. Jones); Qu'Appelle, Assiniboia, July 1901.

83. *Papilio alexiars* Hopff. (1866).

Papilio alexiars Hopffer, *Stett. Ent. Zeit.* xxvii. p. 31. n. 12 (1866) (Mexico).

♂ ♀. In shape of wings intermediate between *P. rutubus* and *P. glaucus*. Forewing: distal margin straight or feebly concave; subbasal yellow interspace acutely triangular, more pointed anteriorly than in *P. glaucus*; third band reaching to M² or beyond.—Hindwing: black abdominal border a little narrower than or as broad as the yellow interspace between it and cell at base of M²; black median band proximal of SC².

Underside: costal σ -mark of forewing centred with yellow, the posterior edge or the proximal dilated portion remaining pure black; the yellow sealing within this mark continuous with the greyish or buffish yellow band situated on the black postdiscal band, the pure black edges of the latter being sharply defined both proximally and distally; yellow submarginal spots linear, forming a continuous (or nearly) band which perceptibly widens costally.—Hindwing with large or small orange patches on disc from R¹ backwards.

Genitalia: ♂. Apex of harpe produced beyond base of ventral process, acuminate, a long, curved, simple, conical tooth at dorsal angle, a few small teeth between it and the apex of the harpe.—♀ not dissected.

Early stages not known.

Hab. Eastern Mexico.

Two subspecies.

a. P. alexiars garcia subsp. nov.

♂. *Upperside*: black bands of both wings much narrower than in *P. alex. alexiars*. Forewing: third black band not extending beyond M²; yellow apical cell-band about as wide as the black band outside it; black distal border not wider between R² and M² than the yellow discal band; a row of eight distinct submarginal spots, which are larger than in *P. alex. alexiars*; yellow discal spots SC³—R³ also larger than in that form.—Hindwing: black distal border narrower than in *P. alex. alexiars*, especially behind, the yellow internervular patches around apex of cell therefore larger; submarginal spots and orange anal marginal spot much larger, tail slenderer and less curved than in the next form; submarginal spot M¹—M² orange, small.

Underside: yellow submarginal line of forewing more or less distinctly interrupted at the veins.—Hindwing: on disc between R¹ and SM² large elongate-triangular orange patches; first and sixth submarginal spots and anal marginal spot totally or for the greater part orange, the other submarginal spots slightly or not at all touched with orange.

Hab. Monterrey, San Luis Potosi.

In the Tring Museum 3 ♂♂.

b. P. alexiars alexiars Hopff. (1866).

Papilio alexiars Hopffer, *l.c.*; Kirby, *Cat. Diurn. Lep.* p. 567. n. 323 (1871); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 241. n. 80. t. 72. fig. 6. 7. ♂ (1893) (Cuesta de Misantla).

♂ ♀. *Upperside*.—Forewing: the yellow portions often more or less shaded

over with black; third black band extending beyond M^2 ; yellow apical cell-band narrower than the black band standing at its distal side; black distal border wider throughout than the yellow discal band; submarginal spots thin, posterior ones absent or vestigial.—Hindwing: anal marginal spot small, slightly orange: black distal border sometimes almost touching cell.

Underside: yellow submarginal line of forewing broad, continuous, only the last one or two spots standing separate.—Hindwing: orange discal spots small.

Hab. Vera Cruz: Cuesta de Misantla.

In the Tring Museum 2 ♂♂, 2 ♀♀.

84. *Papilio pilumnus* Boisid. (1836).

Papilio pilumnus Boisduval, *Spec. Gén. Léop.* i. p. 340. n. 181 (1836) (Mexico); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 16 (1845) (Mexico); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 13. n. 89 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 24. n. 110 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 32. n. 117 (1856); Ménétr., *Enum. Corp. Anim. Mus. Petrop., Léop.* i. *Suppl.* p. 68. n. 1116. t. 7. fig. 2. ♀ (1857) (Mexico); id., *Lc.* ii. p. 110. n. 1116 (1863); Vollenh., *Tijdschr. Ent.* iii. p. 85. n. 139 (1860) (Mexico); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 149 (1863) ("probably ♀ of *P. dauvusi*"); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 313. n. 345 (1864) ("not ♀ of *dauvusi*"); Reak., *Proc. Ent. Soc. Philad.* vi. p. 127 (1867) (New Mexico; ?also Texas and Mexico); Kirby, *Cat. Diurn. Lep.* p. 564. n. 311 (1871); Strecker, *Lep. Rhop. Hel.* p. 13. t. 2. fig. 3 (1873) (New Mexico; Vera Cruz); Mead. in Wheeler, *Rept. Ecpl. Surv.* v. *Zool.* 8. p. 741 (1875) (New Mexico); Edw., *Trans. Amer. Ent. Soc.* vi. p. 11. n. 19 (1877) (Arizona; New Mexico); Gerh., *Macro-Lep. N. Amer.* p. 25. n. 456 (1878) (New Mexico); Strecker, *Butt. Moths N. Amer.* p. 68. n. 8 (1878) (New Mexico; Mexico; Central America); Oberth., *Et. d'Ent.* iv. p. 68. n. 190 (1880) (Mexico; 2 ♂♂, typ. specim.); Schaus, *Papilio* iv. p. 100 (1884) (descr. of larva & pupa); Edw., *Bull. U.S. Nat. Mus.* xxxv. p. 12 (1889) (literat. relat. to metamorph.); id., *Butt. N. Amer.* iii. *Pap.* t. 2. ♂. ♀ (1889); Mayn., *Man. N. Amer. Butt.* p. 14. n. 19. fig. 9. c (1891) (Arizona; Mexico); Haase, *Untersuch. Mimicry* i. p. 90 (1893); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 241. n. 79. t. 72. fig. 10. genit. (1893) (New Mexico; Mexico; Guatemala; open grassy plains; "Colorado" errore?); Eimer, *Artb. Verwandtsch. Schmett.* ii. p. 84. t. 5. fig. 3 (1895) (Mexico); Christ, *Mitth. Schweiz. Ent. Ges.* ix. p. 278 (1897) (southern form of *dauvusi*?); Edw., *Bull. N. Amer.* iii. *Suppl.* p. 8 (1897); Holland, *Butt. Book* p. 310. t. 38. fig. 3. ♂ (1899) (Mexico; occasionally in Arizona); Denton, *Moths Butt. U.S.* i. ii. p. 339 (1898—1900); Dyar, *Bull. U.S. Nat. Mus.* iii. p. 2. n. 7 (1902) (Texas; Arizona; Mexico).

In pattern a primitive form, being of all species the nearest approach to the ancestral form from which the groups of *thoas*, *lycophron*, *glauucus* and *troilus* originated. It agrees in pattern best with the *Glauucus Group* of species, but differs in having in the hindwing the nearly symmetrical cell of *P. lycophron*. The tibiae and tarsi are as pale as in *P. thoas*, but less green. The two sharply defined orange spots M^1 — SM^2 on the *upperside* of the hindwing and the broad black antemedian band of the *underside* centred with drab are the most characteristic features in the pattern of *P. pilumnus*. These orange spots are sometimes preceded by two more spots, which are of the same colour, but not sharply defined. The discal portion of the apical cell-band of the forewing is rather variable, being usually continuous, while in a few specimens the last vein-spot is separated from the band, being minute or vestigial. The yellow or yellowish line distally of the yellow tripartite band on the *upperside* of the forewing is sometimes absent, while it is rather broad in other specimens, especially in Guatemalan individuals.

Genitalia: ♂. Tenth tergite long, feebly spatulate; sternite on each side with an obliquely transverse double ridge, both low, but rather sharply cariniform; harpe broad, produced at apex into a sharp tooth, ventral edge nearly straight, the short,

oblique, dorsal edge dentate, the number and size of the teeth variable.—♀ no dissected.

Early stages described by Schaus, *l.c.*, nearest to those of *P. troilus*.

Hab. Arizona to Guatemala.

In the Tring Museum 2♂♂, 1♀, from : Arizona ; Monterey, Mexico ; Las Vigas, Mexico, June 1896 (W. Schaus) ; Orizaba, May 1896 (W. Schaus) ; Jalapa, February 1896 (W. Schaus) ; Oaxaca ; Guerrero (O. T. Baron) ; Palin, W. Guatemala, 2500 ft., August—September 1904 (A. Hall) ; La Antigua, W. Guatemala, 5000 ft., August 1904 (A. Hall).

VII. *Troilus* Group.

Closely allied to the *Anchisiades* Group.

SC² of forewing in middle or at two-fifths between SC¹ and SC³ ; lower angle of cell not much more obtuse than upper angle ; D² shorter than D³ ; basal cellule of hindwing longer than in the *Anchisiades* Group, PC more strongly curved. Two widely separated rows of spots on underside of forewing ; hindwing below with metallic blue patches.

Genitalia : ♂. Harpe with ventral tooth and apical process, resembling the harpe of the *Anchisiades* Group.—♀. Vaginal armature also of the type of *P. anchisiades*.

Larva with eye-spot on each side of thorax.

Two species.

Antenna and legs black Species No. 85.

Antenna tawny, tibiae and tarsi pale yellowish green . . . Species No. 86.

85. *Papilio troilus* L. (1758).

Papilio Eques Trojanus troilus Linné, *Syst. Nat.* ed. x. p. 459. n. 6 (1758).

The close relationship between *P. troilus* and *P. palamedes* becomes at once evident on comparing the pattern and structure of the two insects. The pale subbasal band on the underside of the hindwing so characteristic of *P. palamedes* is sometimes represented in southern specimens of *P. troilus* by a line which is continued across the forewing, there being a diffuse yellow costal streak at the base of the forewing in all specimens. The subapical cell-spot, usually double, on the underside of the forewing corresponds to the bar of *P. palamedes* ; it is occasionally missing. While most specimens have on the disc of the forewing above and below only one row of spots, which are usually small on the upperside, being often absent, some females bear two rows. These rows are in some males represented anteriorly by a dot in the subcostal fork and a more proximal dot before the fork. Besides the orange costal spots the upperside of the hindwing bears sometimes in the female a small orange spot behind SC². One of the most interesting features in the pattern of *P. troilus* is the disappearance of the orange spot R³—M¹ on the underside of the hindwing. Most specimens bear a few orange scales where the spot has been, sometimes there is even a distinct but small orange spot, but in the majority of specimens the spot is suppressed, the scales having assumed a glaucous buff tint.

First protarsal segment longer than the other four together.

The variability in the dentition of the scaling of the underside is of some interest. The scales have in most females one tooth less than in the males, being on the anterior area of the forewing tri- or quadridentate and in the posterior area

bidentate or entire. On the hindwing the scales of the central orange spots of the discal row have also on the whole one tooth less than the upper and posterior discal spots and the submarginal spots.

Nervation: SC^2 of forewing about halfway between SC^1 and SC^3 , the latter often a little proximal of apex of cell; D^1 before middle of cell; subbasal cellule of hindwing narrow, long, PC angulate.

Genitalia: ♂. Tenth tergite spatulate; sternite with a lateral lobe which is more strongly chitinised than the rest of the sternite, divided by an oblique transverse depression or groove into two ridges. Clasper elongate-triangular, the tip being rounded off; harpe ending in a long and slender, smooth, acute process as in *P. anchisiades*, the nearly straight ventral margin bearing in the middle a prominent tooth; the short dorso-apical edge oblique, dentate.—♀. Armature of the same type as in *P. anchisiades*; edge of orifice proximally produced into a long lobe which widens apically, the apex being truncate and bearing some teeth; anterior surface of lobe longitudinally impressed, posterior surface carinate, except at apex; sides of orifice raised into a smaller lobe or ridge; behind orifice a membranous tubercle densely covered with minute hairs; a large lateral ridge, dentate, gradually becoming lower towards the mesial line of the body, curving towards the middle lobe on the anterior surface of which it disappears; between this ridge and the orifice on each side of the latter a large dentate lobe which stands in connection with the lateral ridge as well as with the elevate edge of the orifice. Bristles on inner surface of anal segment numerous but short.

Early stages first described by Abbot and Smith.

Hab. Atlantic district of the Nearctic Region.

Two subspecies.

a. *P. troilus troilus* L. (1758).

Papilio Eques Trojanus troilus Linné, *Syst. Nat.* ed. x. p. 459. n. 6 (1758); id., *Mus. Lud. Utr.* p. 187. n. 6 (1764); Houtt., *Naturl. Hist.* i. 11. p. 192. n. 5 (1767); Linné, *Syst. Nat.* ed. xii. p. 746. n. 6 (1767); Fabr., *Syst. Ent.* p. 444. n. 7 (1775) (*partim*); Goeze, *Ent. Beytr.* iii. 1. p. 31. n. 6 (1779); Cramer, *Pap. Exot.* iii. p. 25. t. 207. fig. B. C (1779); Fabr., *Spec. Ins.* ii. p. 3. n. 9 (1781) (*partim*); Jabl. & Herbst, *Naturs. Schmett.* ii. p. 242. n. 58 (1784) (*partim*; *see* fig.); id., *l.c.* p. 291. t. 20. fig. 2 (1784); Esper, *Aust. Schmett.* p. 21. n. 6. t. 3. fig. 2. ♂ (1784) (*cit. partim*); Panzer, *Drury's Abbild.* p. 55. t. 11. fig. 2. 3. 5 (1785); Fabr., *Mont. Ins.* ii. p. 2. n. 9 (1787) (*partim*); Gmelin, *Syst. Nat.* i. 5. p. 2225. n. 6 (1790) (*partim*); Fabr., *Ent. Syst.* iii. 1. p. 4. n. 10 (1793) (*partim*).

Papilio Eques troilus, Lange, in Linné, *Syst. Nat.* p. 459. n. 5 (1760) ("in Iudiis").

Papilio (Troes) troilus, Müller, *Naturs.* v. 1. p. 567. n. 6 (1774).

Papilio (troilus), Meerburgh, *Afb. Zeldz. Gew.* t. 4. 7 (1775).

Pterourus troilus, Scopoli, *Intr. Hist. Nat.* p. 433 (1777); Sandler, *Syst. Rev. Amer. Butt.* p. 44 (1872); Sprague, *Psyche* ii. p. 257 (1879) (Wollaston, Mass., May 25.); id., *l.c.* p. 259 (1879) (Mass., May 25 to Aug 5).

Papilio ilioneus Abbot & Smith, *Ins. Georgia* i. p. 3. t. 2. fig. 1 (1797) (larva, pupa, ♂, ♀); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 315. n. 362 (1864); Kirby, *Cat. Diurn. Lep.* p. 567 n. 326 (1871).

Euphœades troilus Hübner, *Verz. bek. Schmett.* p. 83. n. 847 (1818?); id., *Samml. Exot. Schmett.* ii. t. 96 (1822?); Scudd., *Butterfl.* p. 304. 309. fig. 50. 51. 63. 173 (1881); id., *Bull. East. U.S.* ii. p. 1313. t. 8. fig. 4. 5, t. 27. fig. 1, t. 35. fig. 19. 20, t. 40. fig. 3, t. 57. fig. 6, t. 61. fig. 48. 56, t. 66. fig. 13, t. 68. fig. 20, t. 72. fig. 8. 9, t. 76. fig. 18. 19. 22, t. 79. fig. 69-73, t. 82. fig. 4-6, t. 85. fig. 5-7, t. 86. fig. 20-23. 34. 35. 78-80, t. 87. fig. 6. 15. 24 (1889) (metam., morphol., etc.); id., *Psyche* viii. p. 209. t. 5. f. 4, l. juv. (1898); Durand, *ibid.* ix. p. 87 (1900) (N. Toronto, one-brooded).

Papilio troilus, Godart, *Enc. Méth.* ix. p. 60. n. 97 (1819) (*cit. Drury excl.*; "Jamaica" false); Charpent., in Esper, *Aust. Schmett., Append.* p. 5 (1830); Boisdu & Lee., *Hist. Gén. Lép. Amér.*

- Sept. p. 26, t. 10, fig. 1-4 (1833) (larva, pupa, ♂; Georgia; Virginia); Boisd., *Spec. Gén. Lép.* i. p. 331, n. 176 (1836); Harris, *Entom.* i. p. 61 (1840) (larva solitary, covers leaf with coating of silk and binds up the sides to form a kind of trough); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 15 (1845); id. & Westw. & Hew., *Gen. Diurn. Lep.* i. p. 13, n. 85 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. Pap. p. 23, n. 106 (1852); id., *List Lep. Ins. Brit. Mus.* i. Pap. p. 31, n. 113 (1856); Ménétr., *Énum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 2, n. 28 (1857); D'Urh., *Canad. Nat. Geol.* ii. p. 312, fig. a. b., t. 4, fig. 1 (1857); Gosse, *Lett. Alabama* p. 78 (1859); Newm., *Proc. Ent. Soc. Philad.* i. p. 26 (1861) (N. Jersey; on *sassafras*); Morris, *Syn. Lep. N. Amer.* p. 5, n. 6 (1862); Harr., ed. Flint, *Ins. Inj. Veg.* p. 266 (1862) (life history); Reak., *Proc. Ent. Soc. Philad.* ii. p. 135, n. 1 (1863) ("Chiapas" false); Weidem., *ibid.* ii. p. 148 (1863) (Canada to Mexico; "West Indies" false); Lintn., *ibid.* iii. p. 51 (1864) (Eastern N. York, very rare); Kirkp., *ibid.* iii. p. 329 (1864) (Cleveland, Ohio, common); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 316, n. 363 (1864); Saund., *Canad. Ent.* i. 73 (1868) (early stages; London; imago appearing in June); Riley, *Amer. Entom.* i. p. 60 (1868); Pack., *Guide Study Ins.* p. 247 (1868); Bethune, *Canad. Ent.* ii. p. 8 (1869) (Toronto, July); Harris, *Ent. Corresp.* p. 271, t. 2, fig. 1, t. 4, fig. 16 (1869); Scudd., *Canad. Ent.* iv. p. 84 (1872) (Abbot's MSS.); Saund., *ibid.* vi. p. 140 (1874) (Essex Co.); Bean, *Ent. Mo. Mag.* x. p. 248 (1874) (Galena, Ill., scarce, late Aug.); Pagenst., *Verh. Nat. Med. Ver. Heidelb.* (2). i. p. 89 (1874); Edw., *Trans. Amer. Ent. Soc.* vi. p. 10, n. 14 (1877) (Atlantic States; Mississippi valley; = *ilioneus*); Dury, *Cincinnati Soc. Nat. Hist.* i. p. 12 (1878) (Cinc., common); Gerb., *Macro-Lep. N. Amer.* p. 25, n. 455 (1878); Streck., *Bull. Moths N. Amer.* p. 72, n. 18 (1878); French, *Trans. Dept. Agric. Illin.* xv. p. 138 (1878); Oberth., *Et. d'Ent.* iv. p. 69, n. 198 (1880); Middl., *Trans. Dept. Agric. Illin.* xviii. p. 74 (1881); Skinn., *Proc. Ac. N. Sci. Philad.* p. 239 (1882) (scent-organ of larva); Anriv., *K. Sc. Vet. Ak. Handl.* xix. 5. p. 12, n. 6 (1882) (Recensio critica); Edw., *Canad. Ent.* xvi. p. 115 (1884) (habits of larva); French, *Bull. East. U.S.* p. 93 (1884); Gruber, *Papilio* iv. p. 87, t. 2, f. 12-15 (1884) (transf.); Saund., *Rept. Ent. Soc. Ontario* xv. p. 30 (1885) (Point Pelee, L. Erie); Mayn., *Bull. N. Engl.* p. 49, n. 68, t. 7, fig. 68, 68a, ♂ (1886); Mil., *Nat. Sicil.* v. p. 243 (1886) (Monaco!); Riley, *Insect-Life* i. p. 161 (1888) (parasite; *Trogus exosorius*); Skin. & Aaron, *Canad. Ent.* xxi. p. 127 (1889) (Philadelphia, common); Edw., *Bull. U.S. Nat. Mus.* xxxv. p. 10 (1889) (literat. on metam.; cit. Gundl. ad speciem *P. polyareus* dictam referenda); Pack., *Fifth Rept. U.S. Ent. Comm.* p. 650 (1890) (early stages); id., *l.c.* p. 663, 669, 909 (1890) (food-plants); Riley, *Insect Life* iii. p. 462 (1890) (parasite; *Pimpla notanda*); Mayn., *Man. N. Amer. Butt.* p. 10, n. 13, fig. 8, d (1891); Staley, *Canad. Ent.* xxiv. p. 204 (1892) (Marshall, Missouri, iv.—x. not very common); Haase, *Untersuch. Mimicry* i. p. 91 (1893); Skinn., *Ent. News* iv. p. 82 (1893) (N. Carolina); Meeske, *ibid.* iv. p. 117 (1893) (Long I., common); Jones, *ibid.* iv. p. 190 (1893) (Richmond Co., N.C.); Davis, *Journ. N. York Ent. Soc.* i. p. 47 (1893) (Staten I., N.Y., May to Sept.); Riley, *Insect Life* v. p. 207 (1893) (Falls Church, Va., larva abundant, November); Benteum., *Bull. Amer. Mus. N. H.* v. p. 242 (1893) (N. York; descr. of l., p., i.); White, *Ent. News* v. p. 175 (1894) (Brooklyn); Weed, *Psyche* viii. p. 130, n. 38 (1894) (N.E. Miss.); Osburn, *Ent. News* vi. p. 282, n. 47 (1895) (Tennessee, common, vii. to ix., two broods); Longl., *ibid.* vi. p. 314 (1895) (Chicago); Eimer, *Artb. Verwandtsch. Schneft.* ii. p. 143, t. 8, fig. 2, ♂ (1895) ("nearest to *Pap. asterias*"); Clevel., *Ent. News* vii. p. 73 (1896) (Oneonta, N.Y.); Fiske, *ibid.* vii. p. 241 (1896) (Webster, N.H., not so common as *turnus*, June, July, second brood race in Aug.); Bubaa, *ibid.* viii. p. 98 (1897) (Cleveland, Ohio, May 2 and 3); Dazez, *Bull. Buffalo Soc. N. Sc.* v. p. 107, n. 4 (1897) (Buffalo); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 273 (1897); Rowley, *Ent. News* ix. p. 37 (1898) (Louisiana, Mo., larva making silken case by drawing the edges of the leaf together); Holland, *Bull. Book* p. 315, n. 18, t. 2, fig. 18, 19, 20, larva, t. 6, fig. 5, 6, 7, pupa, t. 41, fig. 5, ♂ (1899); Denton, *Moths Bull. U.S.* p. 351, fig. larva and pupa, plate ♀ (1898-1900); Walk., *Rept. Ent. Soc. Ontario* xxxii. p. 85 (1902) (Point Pelee, Leamington); Beutenm., *Bull. N. York City* p. 5, n. 3, fig. ♀ (1902); Dyar, *Bull. U.S. Nat. Mus.* lii. p. 3, n. 13 (1902) (Atlantic States; N.W. Territory); Heink., *Ent. News* xiv. p. 335 (1903) (Meramec Highlands, St. Louis Co., April 12); Franek., *Ent. News* xv. p. 111 (1904) (aberration); id., *l.c.* xvi. p. 91 (1905) (Passaic, N. Jersey, aberration).
- Papilio troilus* (!), Edwards, *Papilio* ii. p. 76 (1882).
- Papilio troilus* var. *ilioneus*, Haase, *Untersuch. Mimicry* i. p. 91 (1893).
- Pterurus* (!) *troilus*, Kirby, in Allen's *Nat. Libr., Lep. Butt.* ii. p. 289 (1896); id., in Hübn., *Summl. Exot. Schneft.* ed. ii. p. 100, t. 309, fig. 1, 2 (190—?).
- Pterurus ilioneus*, Kirby, in Allen's *Nat. Libr., l.c.*
- Papilio troilus* var. *radiatus* Strecker, *Lep. Rhop. Hel. Suppl.* iii. p. 17 (1900) (Washington, D.C.; Allegheny Co., Pa.).

♂ ♀. Submarginal spots of both wings smaller than in southern specimens, those of hindwing more or less bluish. We have received from the American Ent. Co. (Mr. G. Franck, who has shortly described it in 1905, *l.c.*) a curious specimen which deserves special description, as it corresponds in pattern to the ab. *calverleyi* of *P. polyxenes asterius*. It was captured in June at Westfield, New Jersey.—*Upperside*.—Forewing: submarginal spots enlarged, extended to edge of wing, where they are confluent; costal edge thinly creamy white at apex; distal margin slightly undulate.—Hindwing: orange costal spot small, discal band olive-buff, rather well defined and narrow, not entering cell; submarginal spots extended to margin, bluish, fringe entirely creamy white; a yellow anal submarginal streak, a yellow marginal spot M^1 — M^2 , and another behind M^2 ; dentition of wing feeble; the colour of the submarginal spots pervading the tail, except a black central streak.—On *underside* the marginal bands as above, but the spots composing that of the hindwing a little more distinctly separate and all orange mesially; the orange discal spots all present, inclusive of spot R^3 — M^1 ; tail black, except at edges. The specimen has also a very peculiar neurulation.—Forewing: costal vein forked before middle of wing, the fork being on a level with the point of origin of SC^1 , the short additional (anterior) branch extending a little beyond apex of cell; SC^3 before angle of cell; M^2 forked in middle, the two branches remaining separate in the left wing, while in the right wing the branches unite again before reaching the edge of the wing; on both wings there is an additional discal spot between the two branches, and on the left wing also an additional spot at the margin; spur of median nervure continued distad for one-third the way to distal margin—this additional vein being the so-called first submedian, of which the spur of *Papilionidae* is the remnant. On the hindwing M^2 forked on the left wing beyond the orange discal spots of the underside, on the right wing before these spots, there being on the latter wing an additional discal spot and also a spot at the margin.

Hab. Georgia northward to Canada, westward to Texas and the Mississippi plains, in the north-west as far as the North-West Territory of Canada.

In the Tring Museum 70 ♂♂, 50 ♀♀ and some larvae from: Rayleigh, N. Carolina (Brimley); Nelson Co., Virginia (Wirt Robinson); Jefferson Co., Kentucky (Troxler); Nashville, Tennessee (Osburn); Makanda, Illinois (Snyder); Texas.

b. P. troilus texanus Ehrm. (1900).

Papilio troilus var. *texanus* Ehrmann, *Canad. Ent.* xxxii. p. 348 (1900) ("Houston, Texas").

Papilio troilus texanus, Dyar, *l.c.* p. 3. n. 13a (1902); Skinn., *Ent. News* xiv. p. 275 (1903) (Chokoloskee, Fla.).

Papilio troilus, Laurent, *ibid.* p. 296 (1903) (Miami, Fla., common).

♂ ♀. Submarginal spots of both wings large. On underside rather often a pale subbasal band on hindwing or on both wings, and a streak behind SM^2 .

Hab. Florida.

Described by Ehrmann from a single specimen said to be from "Houston, Texas." The Texas specimens which we have seen agree much better with the previous form than with Florida individuals. The locality given by Mr. Ehrmann is perhaps erroneous.

In the Tring Museum 14 ♂♂, 2 ♀♀, from: Chokoloskee, June 1903; Titusville, August 1894; Florida, August—September 1895 (Priddy).

86. *Papilio palamedes* Drury (1770).

Papilio Eques Achivus palamedes Drury, *Illustr. Exot. Ins.* i. p. 37. t. 19. fig. 1. 2. & Index (1770) (Carolina).

♂ ♀. Antenna tawny. Tibiae and tarsi pale greenish, as in *P. thoas* and allies. In neurulation and genitalia similar to *P. troilus*.

Discal band of hindwing, *above*, usually distal of cell, often touching cell, many specimens bearing a small pale yellow cell-spot. Cell-bar of forewing sometimes vestigial on upperside; yellow subbasal band of underside of hindwing often continued across cell of forewing.

Genitalia: ♂. Tenth tergite longer and narrower than in *P. troilus*; harpe as in that species, but the ventral tooth shifted towards the apex, standing close to the apical process.—♀. Mesial process standing at vaginal orifice sinuate apically, non-dentate, lateral lobe less strongly dentate than in *P. troilus*, lateral ridge non-dentate, but the edge irregular. Bristles on inner surface of anal segment as in *P. troilus*.

For early stages see Boisd. & Lee. (1833).

Hab. Southern Atlantic district of the Nearctic Region, extending into Mexico.

Two subspecies.

a. *P. palamedes palamedes* Drury (1770).

Seba, *Thesaur.* iv. p. 51. t. 43. fig. 3. 4 (1764).

Papilio Eques Achivus palamedes Drury, *l.c.*; Cramer, *Pap. Exot.* i. p. 146. t. 93. fig. A. B (1776) (N. York); Goeze, *Ent. Beytr.* iii. 1. p. 73. n. 11. (1779) (*partim*); Jung, *Alphab. Verz.* p. 77 (1792) (= *chalcus*).

Papilio Eques Achivus chalcus Fabricius, *Syst. Ent.* p. 453. n. 44 (1775); Goeze, *Ent. Beytr.* iii. 1. p. 73. n. 10 (1779); Fabr., *Syst. Ent.* iii. 1. p. 31. n. 90 (1793).

Papilio Eques Achivus flavomaculatus Goeze, *Ent. Beytr.* iii. 1. p. 87. n. 72 (1779) (nom. pro Sebae t. 43. fig. 3. 4).

Papilio Eques Achivus chalcus Fabricius, *Spec. Ins.* ii. p. 18. n. 70 (1781); id., *Mant. Ins.* ii. p. 9. n. 80 (1787); Jabl. & Herbst, *Nat. Schmett.* iii. p. 139. n. 94. t. 42. fig. 1. 2 (1788) (= *palamedes* Drury); Gmelin, *Syst. Nat.* i. 5. p. 2239. n. 315 (1790).

Papilio Eques Achivus calchas Esper, *Aust. Schmett.* p. 229. n. 106. t. 56. fig. 3 (1798) (nom. nov. loco *chalcus*).

Papilio calchas, Godart, *Enc. Méth.* ix. p. 59. n. 92 (1819); Boisd. & Lee, *Hist. Gén. Lép. Amér. Sept.* p. 17. t. 5. fig. 1—4 (1833) (larva, pupa, ♂); Boisd., *Spec. Gén. Lép.* i. p. 337. n. 178 (1836); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 16 (1845) (E. Florida; Georgia); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 13. n. 91 (1846) (U.S.; Mexico; "Jamaica" false); Gosse, *Letters from Alabama* p. 169. 272 (1859).

Papilio palamedes, Drury, ed. Westw., *Illustr. Exot. Ent.* i. p. 36. t. 19. fig. 1. 2 (1837); Poey, *Mem. Hist. Nat. Cuba* i. p. 197. n. 12 (1851) (Cuba?; *palamedes* has priority); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 25. n. 113 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 33. n. 120 (1856) (E. Florida; Georgia); Lucas, in Sagra, *Hist. Cuba* vii. p. 203 (1857) ("Cuba" false); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863) (U.S.; "West Ind." false); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 316. n. 364 (1864); Jaeg., *Life N. Am. Ins.* p. 210 (1864); Butler, *Cat. Diurn. Lep. descr. Fabr.* p. 250. n. 53 (1869); Kirby, *Cat. Diurn. Lep.* p. 543. n. 166 (1871); Edw., *Trans. Amer. Ent. Soc.* vi. p. 11. n. 20 (1877) (Florida to Virginia; Gulf States; = *calchas*); Gerb., *Macro-Lep. N. Amer.* p. 25. n. 439 (1878); Streck., *Butt. Moths N. Amer.* p. 73. n. 19 (1878) (Virginia southward, south-west to Louisiana); Oberth., *Et. d'Ent.* iv. p. 69. n. 199 (1880) (Florida); Edw., *Canad. Ent.* xiii. p. 119 (1881) (life hist.); id., *l.c.* xvi. p. 115 (1884) (habits of larva); Aaron, *Papilio* iv. p. 172 (1884) (S. Texas); Edw., *l.c.* xviii. p. 15 (1886) (Glencoe, Nebraska); French, *Butt. East. U.S.* p. 95 (1886); Edw., *Bull. U.S. Nat. Mus.* xxxv. p. 11 (1889) (liter. on metam.); Skinn., *Ent. News* i. p. 110 (1890) (Philadelphia, one specimen); Mayn., *Mon. N. Amer. Butt.* p. 10. n. 14. fig. 8. a (1891); Jones, *Ent. News* iv. p. 190 (1893) (Richmond Co., N.C.); Haase, *Untersuch. Mimicry* i. p. 90 (1893) ("the

Palamedes Group shows close affinities with the *Danaus* Group"; Eimer, *Arb. Verwandtsch. Schmett.* ii. p. 145, t. 8, fig. 3. ♂, fig. 4. ♀ (1895) ("closely related to *asterioides*, *asterias* and *brevicauda* on one side and to *hairdi* ♀ on the other"); id., *Orthogen.* p. 34, fig. 13 (1897); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 270 (1897) ("near relative of *zolicaon*"); Holland, *Butt. Book* p. 315, n. 19, t. 42, fig. 1, ♀ (1899); Dent., *Moths Butt. U.S.* p. 353, 354, fig. (1898—1900); Comst., *Ent. News* xiii. p. 75 & 77 (1902) (L. Josephine, Fla., quite common, Feb. 20 to March 25); Dyar, *Bull. U.S. Nat. Mus.* lii. p. 3, n. 12 (1902) (S. Atl. States).

Papilio chalceus, Morris, *Syn. Lep. N. Amer.* p. 7, n. 9 (1862).

Pterurus palamedes, Kirby, in Hübn., *Samml. Erot. Schmett.* ed. ii. p. 101, t. 115, fig. 3, 4 (190-?)

♂ ♀. The discal spots on the underside of the hindwing on the whole less extended orange in Florida specimens than in individuals from other places, and the orange portion of the spot R³—M¹ often reduced.

Hab. Florida to Philadelphia, westwards to the Mississippi plains.

In the Tring Museum 24 ♂♂, 14 ♀♀, from : Texas ; New Orleans, April 1902 (A. Hall) ; Titusville, Florida, August—September 1894 and 1895.

b. P. palamedes leontis subsp. nov.

♂ ♀. A small form. *Upperside*.—Forewing : discal spots smaller than in the previous, in the female being smaller than the submarginal ones ; streak in front of SC³ absent or vestigial ; cell-bar absent or faintly vestigial.—Hindwing : discal band narrower than in *P. p. palamedes*, the spots R²—M² better defined.

Underside.—Forewing : cell-bar smaller than in the preceding form, often reduced to two small dots ; discal spots also smaller ; no subbasal band across cell.—Hindwing : discal band narrower and on the whole more extended orange, and the glossy blue spots larger, than in *P. p. palamedes*.

Hab. Monterey, Mexico.

In the Tring Museum 6 ♂♂, 1 ♀.

VIII. Anchisiades Group.

Pronotum, or underside of thorax, or both, spotted with red or orange ; abdomen black, at base with a lateral dot or short streak which is of the same colour as the thoracical spots, no yellow or buff lateral line on abdomen. Cell of forewing beneath not streaked with yellow. Hindwing without blue spots.

Neuration : SC² of forewing very much nearer SC³ than SC³ ; D² longer than D³ ; lower angle of cell very obtuse ; PC of hindwing long and gradually curved.

Genitalia : ♂. Tenth tergite spatulate ; sternite laterally in middle incrassate to form a small double ridge or two teeth, of which the proximal one is hairy. Harpe long and (with the exception of *P. hyppason*) flat, being apically produced into a long and nearly straight point.—♀. Edge of vaginal orifice proximally raised into a prominent curved process, which is bicarinate or channelled in front and deeply grooved on posterior side ; behind the orifice a membranous tubercle clothed with minute hairs ; laterally a spatulate and dentate lobe or a pointed process, and further proximad a ridge which is shell-like laterally.

The larvae are gregarious, feeding chiefly on *Citrus*.

- A. Sexes dissimilar ; SC² of hindwing much more proximal than M² ; a red basal patch on underside of hindwing behind cell ; spots of pronotum rufous red, those on underside of thorax and at base of abdomen pale buff Species No. 87.

- B. Sexes similar, with long spatulate tail; a creamy white band across disc (No. 88); or this band vestigial, in the latter case the marginal spots of both wings large (No. 89). Species No. 88, 89.
- C. Sexes similar; no sharply marked band across forewing; marginal spots of forewing small or absent, or the tail absent
- a. Hindwing without tail, marginal spots all large, cream-colour. Species No. 90.
Hindwing with or without tail, marginal spots small, except the first spot on the hindwing, which is often somewhat enlarged *b*.
 - b*. On upperside of hindwing two parallel rows of spots, well separated from one another, the proximal or the distal row often missing *c*.
The submarginal spots of hindwing close to the discal ones, touching them or being merged together with them, the submarginal spots R^3-M^2 enlarged *d*.
 - c*. Submarginal spots of hindwing above cream-colour in ♂; marginal spots of hindwing large in ♀, almost entirely orange-red above and below Species No. 93.
Submarginal spots of hindwing red in both sexes; marginal spots of ♀ moderately large, more white than orange-red below Species No. 92.
Submarginal spots absent or vestigial, only one row on upperside, consisting of a few small spots Species No. 94.
 - d*. Forewing above with yellowish white patch from hindmargin forward to M^2 , vestigial below Species No. 91.
No such patch *e*.
 - e*. Hindwing with short acute tail; harpe non-dentate *f*.
Hindwing without tail, or tooth R^3 projecting, broad; harpe dentate Species No. 95.
 - f*. Forewing below with white patch across apex of cell Species No. 97.
Forewing below without white patch across apex of cell Species No. 96.

87. *Papilio hippason* Cram. (1775).

- ♂. *Papilio Eques Trojanus hippason* Cramer, *Pap. Exot.* i. p. 46. t. 29. fig. E (1775) (Surinam); Goeze, *Ent. Beytr.* iii. 1. p. 37. note (1779) ("var. of *P. aeneus*"); Esper, *Aust. Schmett.* p. 63. n. 28 (1788).
- ♀. *Papilio Eques Trojanus amosis* Cramer, *l.c.* iii. p. 139. t. 269. fig. A, B (1780) (Surinam); Stol., *ibid.*, *Suppl.* p. 1. t. 1. fig. 1A, 1B (1787) (larva, pupa; this species? or *P. androgeus*?).
- ♂. *Papilio Eques Trojanus hippason*, Esper, *l.c.* t. 16. fig. 2 (1788).
- ♀. *Papilio Eques Trojanus amosis*, *id.*, *l.c.* p. 64. n. 29. t. 76. fig. 3 (1788).
- Papilio Eques Trojanus aeneus*, Fabricius, *Spec. Ins.* ii. p. 8. n. 32 (1781) (*partim*).
- Papilio Eques Trojanus aeneus* γ) *P. hippason*, Gmelin, *Syst. Nat.* i. 5. p. 2233. sub n. 16 (1790).
- Papilio Eques Trojanus dinas* Fabricius, *Ent. Syst.* iii. 1. p. 16. n. 47 (1793) (*partim*).
- Prionceps dominans hippason*, Hübner, *Samml. Exot. Schmett.* i. t. 124 (1806-?).
- Priamides amosis*, *id.*, *Verz. bek. Schmett.* p. 87. n. 905 (1818?).
- Priamides hippason*, *id.*, *l.c.* p. 87. n. 906 (1818?) (*partim*).
- ♂ ♀. *Papilio amosis*, Godart, *Enc. Méth.* ix. p. 35. n. 29 (1819) (Guyane).
- ♂. *Papilio hippason*, *id.*, *l.c.* ix. p. 35. n. 30 (1819) (Guyane; "euristeus" excl.).
- ♂ ♀. *Papilio hippason*, Boisduval, *Spec. Gén. Léop.* i. p. 281. n. 106 (1836) (*amosis* = ♀ of *hippason*; Surinam); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 11 (1845) (Brazil); *id.*, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 19. n. 214 (1847) (Guiana); Erichs., in Schoubs., *F. F. Brit. Guiana*

- p. 593 (1848) (♀ probably = *amosis* Cram.); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 58. n. 268, t. 10, fig. 3. ♀ (1852) (Demerara; Surinam; Pará); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 256 (1854) (Pará; forest); Gray, *List Lep. Ins. Brit. Mus. i. Pap.* p. 70. n. 284 (1856) (Demerara; Surinam; Pará); Ménétr., *Enum. Corp. Anim. Mus. Petrop., Léop.* i. p. 68. n. 1127 (1857) (Guiana); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 337 (1861) (Guiana; Pará); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 298. n. 131 (1864) (Surinam; Pará); Kirby, *Cat. Diurn. Lep.* p. 523. n. 34 (1871) (Guiana); Oberth., *Et. d'Ent.* iv. p. 80. n. 263 (1880) (Surinam); Staud., *Erot. Tuff.* i. p. 13 (1884) (Surinam; Amazons; Peru); Haase, *Untersuch. Mimicry* i. p. 99. t. 10, fig. 73. ♀ (1893) (Surinam; Pará on plate; figure not correct).
- Papilio hippason*, Cram. Local var. *paraensis*, Bates, *Journ. Entom.* i. p. 225. n. 9 (1862) (Pará); Oberth., *Et. d'Ent.* iv. p. 116. n. 263 (1880) (Pará).
- Papilio hippason* var. a. *P. hipp.* var. *paraensis*, Kirby, *Cat. Diurn. Lep.* p. 523. sub n. 34 (1871) (Pará).
- Papilio hippason*, Möschler, *Verh. Zool. Bot. Ges. Wien* xxvi. p. 295 (1876) (♀, Surinam).
- Papilio amasis* (?), Burmeister, *Descr. Rép. Argent. v. Léop.* p. 4. sub n. 4 (1879) (Stoll's t. 1 fig. 1. "is larva of *P. polycaon*").
- ♂. *Papilio hippasonides* Grose-Smith, *Rhop. Erot.* iii. *Pap.* t. 22, fig. 3. 4 (1902) (Yungas, Bolivia). *Ithobalus amosis*, Kirby, in Hübn., *Samml. Erot. Schmelt.* ed. ii. p. 92. t. 125, fig. 3. 4 (190-?) ('not the ♀ of *P. hippason* Cram.," errore).

While Bates, Felder, Kirby (1871) and Standinger, deceived by the pattern of the insect, put *P. hippason* in the *Ariarathes Group*, Haase placed it with *P. pharnaces* and *anchisiades*. That is indeed the correct position, as is borne out by the structure of the imago. In the new edition of Hübn. the species is placed by Kirby in *Ithobalus*, the type of which is an *Aristolochia*-Swallowtail. The insect has many peculiarities separating it from the other members of the *Anchisiades Group*. It is individually rather variable, but does not appear to have split up into geographical forms. The species can easily be recognised by the presence of a large red spot on the underside of the hindwing behind cell close to base. Kirby, *l.c.*, makes the erroneous statement that the marginal spots of the hindwing of *P. hippason* are red.

♂♀. Antennae in male a little extending beyond apex of cell of forewing, in female not reaching apex of cell; club gradual and long, end-segment conical, basally broader than in the allied species. Palpus black. Spots of breast grey or buff, those on pronotum rufous red. Scales of upperside of forewing obtusely (♂) or more acutely (♀) tridentate, the white ones partly bidentate, those of the upper layer of the last patch in male entire; on underside the scales strongly bidentate, those of the upper layer entire from the middle of the hindmargin forward, especially the white ones. The spots of the hindwing consist of rufous red and white scales; the red scales narrow, long, entire or feebly sinuate, opalescent, many being yellow at base; some of the dark scales at the edge of these spots or within them bright metallic blue under the lens.

Neuration: M^1 and M^2 of forewing closer together than R^3 and M^1 ; PC of hindwing evenly curved, SC^2 more proximal than in the allied species, standing closer to base than to R^1 .

Genitalia: ♂. Tenth tergite spatulate, beneath carinate, except at apex; tenth sternite laterally with two teeth projecting upwards, the second tooth pointed, the first much shorter, hairy; clasper short, broad, rounded; harpe broad, the ventral margin raised and distally produced into a tapering process; beyond this process the harpe narrowed to a slightly spatulate lobe, which is curved ventrad and bears a variable number of teeth at the rounded apical edge.—♀ Edge of vaginal aperture raised, denticulate laterally, bisinuate in front, the mesial frontal lobe triangular; in front of the orifice a high ridge, strongly chitinised; between

this ridge and the orifice on each side of the latter a rather long and slender pointed process.

Each sex dichromatic, with intergradation. These forms are :—

a. ♂-f. *hypason* Cram. l.c.; *hypasonides* Grose-Smith, l.c.—Band of forewing broader than the interspace between the band and cell, its inner edge crossing vein SM³.

b. ♂-f. *ptilion* nov.—Band of forewing narrow, farther away from cell than in the preceding form, and usually continued farther forward, the spots separate; hindwing above with four or five red spots, seldom less.—Type of name from Iquitos.

c. ♀-f. *amosis* Cramer, l.c.—Forewing with hardly a trace of a white patch.

d. ♀-f. *paraensis* Bates, l.c.—Forewing with large white or buffish patch, variable in extent, often entering cell.

Early stages not known with certainty. Stoll's figures may belong here, though Burmeister refers them to *P. androgeus* (= *polycaon*).

Hab. The Guianas; Amazons; Peru; Bolivia.

In the Tring Museum 25 ♂♂, 13 ♀♀, from: R. Demerara, British Guiana; Paramaribo, Surinam; Pará (Stuart, Bates); R. Jurua; Iquitos; Salinas, R. Beni, July 1896 (Stuart); R. Songo to R. Suapi, Bolivia, 1100 m., March—June 1896 (Garlepp); Province Sarra, S. Cruz de la Sierra, February—April 1904 (J. Steinbach.)

88. *Papilio pelaus* Fabr. (1775).

Papilio Eques Trojanus pelaus Fabricius, *Syst. Ent.* p. 444. n. 9 (1775) ("India," Drury).
Papilio orufagus Weidemeyer, l.c. p. 147 (1863) (sub syn.).

In Jones's unpublished drawings *P. pelaus* is figured from Drury's collection. As Fabricius described the insect from this collection, Jones's figure may be taken as representing the type of *pelaus*. The figure agrees best with specimens from Jamaica, from which island Drury possessed many insects. Westwood's figure (1842) was apparently taken from the same specimen.

♂♀. Sexes similar, but the markings rather larger and the submarginal spots of the upperside usually more numerous in female than in male, and larger beneath than above.—Forewing with a creamy band from costal margin to hinder angle standing just outside cell or entering it.—A row of rufous red submarginal spots on hindwing parallel to distal margin, the upper spots absent from male on upperside, the last spot more or less creamy; a discal row of small creamy spots on underside, sometimes rufous, rarely absent, in female occasionally marked also on upperside.

Genitalia: ♂. Tenth tergite spatulate; harpe of the same type as in *P. anchisiades*, long, non-dentate, apex produced into an acute process.—♀. Proximal ridge of vaginal cavity membranaceous in middle and here hardly raised, laterally dilated, rounded; lateral dentate lobe spatulate, rounded at apex; bearing two or three teeth; the process standing at orifice short, broad, widened laterad, triangular; the mesial ridge extending from this process forward bicarinate, the edges being raised.

Larva described by Cockerell (1893).

Hab. Jamaica; Cuba; Haiti; Porto Rico.

a. P. pelaus pelaus Fabr. (1775).

Papilio Eques Trojanius pelaus Fabricius, *l.c.*; Goeze, *Ent. Beytr.* iii. 1. p. 41. n. 6 (1779); Fabr. *Spec. Ins.* ii. p. 4. n. 12 (1781); id., *Mant. Ins.* ii. p. 2. n. 12 (1787); id., *Ent. Syst.* iii. 1. p. 5. n. 15 (1793) (cit. Cram. excl.).

Papilio Eques Trojanius pelaus (?), Gmelin, *Syst. Nat.* i. 5. p. 2228. n. 279 (1790) (*partim*).

Heraclides pelaus, Hübner, *Verz. bek. Schmett.* p. 83. n. 853 (1818?) (*partim*); Godart, *Enc. Méth.* ix. p. 61. n. 99 (1819) (descr. from Fabric.); Boisduval, *Spec. Gén. Lép.* i. p. 367. n. 210 (1836) (descr. from Fabric.); Westw., *Arc. Ent.* i. p. 107. t. 18. fig. 1. 2 (1842); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 17 (1845) (Jamaica); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 40. n. 202 (1852) (Jamaica); id., *List Lep. Ins. Brit. Mus. i. Pap.* p. 55. n. 213 (1856) (Jamaica); Herr.-Sch., *Corrresp. Bl. Zool. Min. Ver. Regensb.* xvi. p. 141 (1862) (Cuba); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863) (*partim*); Herr.-Sch., *l.c.* xviii. p. 173. n. 9 (1864); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 309. n. 284 (1864) (*partim*); Cuba, Jamaica; Butl., *Cat. Diurn. Lep. descr. Fabric.* p. 246. n. 42 (1869) (Jamaica); Kirby, *Cat. Diurn. Lep.* p. 542. n. 164 (1871) (*partim*); Dewitz, *Stett. Ent. Zeit.* xxxviii. p. 234. n. 4 (1877) (Porto Rico); Butl., *Proc. Zool. Soc. Lond.* p. 481. n. 35 (1878) (Jamaica); Gündl., *Papilio* i. p. 113 (1881) (Cuba); id., *Contr. Ent. Cuba*, p. 126 (1881) (*partim*); Eastern Cuba, Jamaica, Porto Rico; Möschl., *Abh. Senkenb. Nat. Ges.* xvi. p. 91. n. 4 (1891) (Porto Rico); Gündl., *An. Hist. Nat. Madrid* xx. p. 114. n. 4 (1891) (Porto Rico); Haase, *Untersuch. Mimicry* i. p. 98 (1893) (*partim*); Jamaica, Cuba; Fox & Johns., *Ent. News* iv. p. 3 (1893) (Jamaica); Cocker., *Psyche* vi. p. 450 (1893) (full-grown larva, July); id., *Journ. Jamaica Inst.* i. p. 179 (1893) (larva); Ehrm., *Ent. News* vi. p. 303 (1895) (♀, Jamaica); Swains., *Journ. N. York Ent. Soc.* ix. p. 78 (1901) (larva); Robins., *ibid.* xiv. p. 19 (1903) (Jamaica).

♂ ♀. Band of forewing close to cell, in female always entering it, sometimes also in male, especially often beneath, the last spot of the band usually ill-defined. — On the hindwing there are in male three or more submarginal spots, the female having six, the spots variable in size, larger and on an average more numerous in Cuban specimens than in Jamaican individuals.

Hab. Jamaica; Cuba; Porto Rico, this form?

In the Tring Museum 9 ♂♂, 5 ♀♀, from: Bath, S. Thomas, Jamaica (Taylor); Cuba (Gundlach).

b. P. pelaus imerius Godt. (1819).

Papilio imerius Godart, *Enc. Méth.* ix. p. 69. n. 121 (1819) ("Ind. orient."); Boisduval, *Spec. Gén. Lép.* i. p. 312. n. 150 (1836) (Haiti); Grimsh., *Trans. Roy. Soc. Edinb.* xxxix. 1. No. 1. p. 8 (1897) (= "zetes Westw." err. det.).

Papilio augius Ménétrés, *Bull. Moscou* ii. p. 293. n. 3 (1832) (Haiti).

Papilio pelaus, Doubleday, West. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 179 (1846) (*partim*; Haiti); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 4. n. 65 (1857) (Haiti); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863) (*partim*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 309. n. 284 (1864) (*partim*); S. Domingo; Kirby, *Cat. Diurn. Lep.* p. 542. n. 164 (1871) (*partim*); Obertb., *Et. d'Ent.* iv. p. 69. n. 203 (1880) (Haiti); Haase, *Untersuch. Mimicry* i. p. 98 (1893) (*partim*); Haiti).

Papilio pelaus var., Gray, *List Lep. Ins. Brit. Mus. i. Pap.* p. 55. sub n. 213 (1856) (Haiti).

♂ ♀. Band of forewing anteriorly narrower than in the preceding, more straight, not narrowing behind, the last spot being proportionally larger than in the preceding subspecies, spot SC²—SC³ reduced in ♂ or absent, the band not entering cell either above or below. — Submarginal spots of hindwing smaller.

Hab. Haiti.

In the Tring Museum 2 ♂♂.

89. *Papilio oxynius* Hübn. (1834?).

Laertias oxynius Hübner, *Samml. Exot. Schmett.* iii. t. 5 (1834?) (Cuba).

Papilio augustus Boisduval, *Spec. Gén. Lép.* i. p. 358. n. 200 (1836) (Cuba); Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vi. p. 50 (1838) (Cuba).

Papilio oxynius, Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 174 (1846); Poey, *Mem. R. Soc. Econ. Habana* p. 236 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 39. n. 199 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 55. n. 210 (1856) (Cuba); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 309. n. 285 (1864) (Cuba); Herr.-Sch., *Corresp. Bl. Zool. Min. Ver. Regensb.* p. 173. n. 6 (1864) (common); Kirby, *Cat. Diurn. Lep.* p. 542. n. 163 (1871) (Cuba); Oberth., *Et. d'Ent.* iv. p. 69. n. 204 (1880); Gundl., *Papilio* i. p. 113 (1881) (Cuba); id., *Contr. Ent. Cuba*, p. 127 (1881); id., *Berl. Ent. Zeitschr.* xxxv. p. 131 (1890) (descr. of larva); Honr., *Sitzber. Berl. Ent. Zeitschr.* xxxiii. 1889. p. 8 (1890) (larva social, on *Zanthoxylum*); Riley, *Insect Life* iii. p. 32 (1890) (larvae social acc. to Gundlach); Haase, *Untersuch. Mimicry* i. p. 99 (1893).

Papilio (Laertias) oxynius, Lucas, in Sagra, *Hist. Cuba* vii. p. 207 (1857).

Pterurus (!) *oxynius*, Kirby, in Hübn., *Samml. Exot. Schmett.* ed. ii. p. 100. t. 459. fig. 1 2 (190-?):

♂ ♀. Similar to *P. pelaus*; marginal spots of both wings larger; band of forewing more or less vestigial, in male usually absent from upperside.

Genitalia: ♂. Harpe broad, denticulate.

Larva gregarious at night, resting together on the trunk of the tree of which the leaves serve as food.

Hab. Cuba.

In the Tring Museum 4 ♂♂, 1 ♀.

90. *Papilio epenetus* Hew. (1861).

Papilio epenetus Hewitson, *Exot. Butt.* ii. *Pap.* t. 5. fig. 14. 15. ♂ (1861) (Ciuchona, Ecuador); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 312. n. 319 (1864) (bab. ?); Kirby, *Cat. Diurn. Lep.* p. 539. n. 146 (1871); Haase, *Untersuch. Mimicry* i. p. 99 (1893); Haensch, *Berl. Ent. Zeitschr.* xlvi. p. 151 (1903) (Balsapamba, W. Ecuador, larva on orange-trees in June, short descr. of larva and pupa).

♂ ♀. Sexes similar, female a little paler than male. Forewing with a row of buffish yellow patches on underside. Hindwing, on upperside, with or without some red dots on disc; on underside a complete row of red discal spots, and rather close to it a row of buffish yellow submarginal spots, of which the posterior ones are somewhat larger than the anterior ones; marginal spots large above and below, buffish yellow.

Genitalia: ♂. Tenth tergite elongate, slightly spatulate. Clasper ventrally somewhat emarginate before apex; harpe of the same type as in *P. anchisiades*, ending in an acute process which is slightly curved towards the clasper; proximally of the process there is or is not a small marginal tooth.—♀ not dissected.

Larva and pupa described by Haensch, *l.c.*, closely agreeing with those of *P. anchisiades*.

Hab. Western Ecuador.

In the Tring Museum 3 ♂♂, 2 ♀♀, and several larvae and pupae, from: Balsapamba (R. Haensch); Celica to Sapatillo, July 1899 (Simons).

In coll. Oberthür from Chimbo and Balsapamba.

91. *Papilio chiansiades* Westw. (1872).

Papilio chiansiades Westwood, *Trans. Ent. Soc. Lond.* p. 101. t. 3. fig. 4. 5. ♂ (1872) (R. Topo, Ecuador); Oberth., *Et. d'Ent.* iv. p. 116. n. 258^{bis} (1880) (Teñé; Pebas).

Papilio chiansiades (!), Kirby, *Cat. Diurn. Lep.* p. 812. n. 353 (1877); Kirby, *Trans. Ent. Soc. Lond.* p. 353 (1881) (Sarayaçu); Staud., *Exot. Tagf.* p. 16. t. 11. ♀ (1884) (Amazons; Ecuador); Haase, *Untersuch. Mimicry* i. p. 99 (1893); Michael, *Iris* vii. p. 213 (1894) (Sao Paulo de Olivença); Eimer, *Orthogen. Schmett.* p. 327 (1897) (*algattes* group !).

♂ Forewing, *above*, with large yellowish white patch from hinder margin to near M², the patch being vestigial *below*.—Hindwing, on *upperside*, with two

small discal and three larger submarginal spots, all red, often much shaded with black, the last submarginal spot distal of the one before it; on *underside* two discal spots M^1 — SM^2 and a complete row of submarginal spots, those between R^3 and M^2 being the largest and partly white.

♀ and early stages not known.

Hab. Eastern slopes of Ecuador and Peru; Upper Amazons.

In the Tring Museum 11 ♂♂ from: Pebas; S. Paulo de Olivença; Iquitos; R. Cachyaco, affl. of R. Huallaga (Stuart); Coca, Ecuador (R. Haensch); Archidona (W. Goodfellow); R. Chuchuras, affl. of R. Palcazu, 320 m. (W. Hoffmanns); La Union, R. Huacamayo, Carabaya, 2000 ft., January 1905, wet season (G. Oeckenden).

92. *Papilio pharnaces* Doubl. (1846).

Papilio pharnaces Doubleday, *Ann. Mag. N. H.* xviii, p. 374 (1846) ("America merid."); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 19. n. 216 (1847) ("Bolivia"); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 64. n. 282. t. 5. fig. 1. ♂ (1852) (Guatemala?); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 73. n. 298 (1856) (Mexico); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 312. n. 321 (1864) (Mexico; "Guatemala"); Kirby, *Cat. Diurn. Lep.* p. 539. n. 145 (1871) (Mexico); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 231. n. 64 (1890) (Mexico: Oaxaca, Putla); iid., *l.c.* p. 730 (1901) (Guanajuato); Haase, *Untersuch. Mimicry* i. p. 99. t. 9. fig. 63 (1893).

♂. *Papilio phanostratus* Godman & Salv., *l.c.* p. 232. n. 65 (1890) (Jalapa).

♂. *Papilio polycharmus* iid., *l.c.* n. 66. t. 70. fig. 10 (1890) (Mazatlan).

♂♀. Hindwing with two rows of spots, the distal row about halfway between cell and distal margin, red, the proximal spots variable in number on upperside. Tail very variable in length; in one of our West Mexican females, from Colima, little more prominent than the other teeth, while it is long in another female from the same place. We do not find any fairly constant difference between specimens from East, West, and South Mexico.

Genitalia: ♂. Tenth tergite slightly spatulate; sternite laterally with obtuse ridge which is transversely impressed, bearing hairs proximally. Harpe dentate at apex dorsally and ventrally.—♀. Vaginal armature as in *P. anchisiades*; the curved process standing at the orifice shorter, the lateral dentate lobes with fewer teeth.

Hab. East, South, and West Mexico.

In the Tring Museum 56 ♂♂, 25 ♀♀, from: Orizaba, April and May 1896 (W. Schaus); Huatuxco; Guadalajara, September—October 1889 (Dr. Buller); Guadalajara, July, August and October, 1896 (W. Schaus); Oaxaca, 6000 ft., June 1904 (A. Hall); Cuernavaca, end of August 1904 (Dr. Gadow).

93. *Papilio erostratus* Westw. (1847).

Papilio erostratus Westwood, *Trans. Ent. Soc. Lond.* v. p. 36. t. 3. fig. 2* (1847) (Guatemala); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* ii. p. 529 (1852); Boisd., *Consid. Léop. Guatem.* p. 8 (1870) (Mexico; Honduras; *rhetus* = ♀ of *erostratus* teste Godman & Salvin); Kirby, *Cat. Diurn. Lep.* p. 540. n. 153 (1871) (Guatemala); Butl. & Druce, *Proc. Zool. Soc. Lond.* p. 365. n. 378 (1874) (Costa Rica, teste van Patten); Oberth., *Et. d'Ent.* iv. p. 80. n. 259 (1880) (Guatemala; Mexico); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 61. t. 69. fig. 9. genit. (1890) (Brit. Honduras; Guatemala; "Costa Rica" teste van Patten); Haase, *Untersuch. Mimicry* i. p. 99. t. 9. fig. 60. ♂. 61, ♀ (1893) (Guatemala).

♀. *Papilio rhetus* Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 65. n. 288. t. 11. fig. 5 (1852) (Guatemala); id., *List Lep. Ins. Brit. Mus.* i. p. 75. n. 305 (1856); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 299. n. 140 (1864) (Guatemala); Kirby, *Cat. Diurn. Lep.* p. 523. n. 38^{bis} (1871); id., *l.c.* p. 810. n. 153 (1877) (= ♀ of *erostratus*).

Papilio herostratus, Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 302 (1864) (Guatemala).

This and the preceding insect (*P. pharnaces*) occur together in Western Mexico, remaining perfectly distinct. There can be no doubt that they are specifically distinct, though they are closely allied.

Sexes dissimilar.

♂. Submarginal spots of upperside of hindwing cream-colour, the last one being usually red; discal spots red or creamy red, never all present, always small, sometimes all absent, most specimens bearing three small spots; on underside both rows red. On the forewing there are posteriorly some creamy submarginal spots, which appear occasionally also on upperside. Fringe-spots of hindwing creamy.

♀. Creamy marginal spots of forewing rather large, the submarginal ones of underside often joined to them. Discal and submarginal spots of hindwing red above and below, larger than in female of *P. pharnaces*; marginal spots red, also large, the extreme fringe being white, last submarginal spot of upperside connected anteriorly with the anal marginal one; tail very slender, being also in male slenderer than in *P. pharnaces*.

Genitalia: ♂. Harpe angulate dorsally, bearing dorsally one or more teeth, and ventrally no teeth or only one.

Early stages not known.

Hab. Guatemala and British Honduras, the record from Costa Rica (van Patten) being very doubtful.

In the Tring Museum, 9 ♂♂, 1 ♀, from: Ciudad de Guatemala (Rodríguez); Palin, W. Guatemala, August—September 1904, 2500 ft. (A. Hall); Guatemala (Salviu).

94. *Papilio rogeri* Boisduval. (1836).

Papilio rogeri Boisduval, *Spec. Gén. Léop.* i. p. 278, n. 102 (1836) (Yucatan). Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 19, n. 221 (1847); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 62, n. 278 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 72, n. 294 (1856); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 312, n. 318 (1864); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 231, n. 63, t. 70, fig. 8, 9. ♂ (1890) (Yucatan; Brit. Honduras).

Papilio pompeius var. d. *P. rogeri*, Kirby, *Cat. Diurn. Lep.* p. 539, sub n. 144 (1871) (Yucatan).

♂. Disc of forewing, *above*, pale from costal to hinder margin, this area widening costad, its inner edge almost evenly curved; on *underside* a row of grey spots at distal side of black basi-discal area.—Hindwing with short tooth R^3 , the red spots on disc arranged in two rows as in the preceding insects, the discal row being represented by only a few spots, usually R^2 — M^2 on upper, and R^2 — SM^2 on under side, some black dots continuing the series to costal vein; submarginal series not marked on upperside, or the first as well as the last spot are vestigial; these two spots usually distinct on underside, while the other submarginal spots are either absent, or are indicated by shadowy blackish dots, bearing rarely a few red scales; marginal spots creamy, anal one red.

♀. Hindwing with two rows of red spots.

Genitalia: ♂. Harpe more strongly rounded ventrally before apex than dorsally, bearing a few teeth at both edges.

Early stages not known.

Hab. Yucatan; British Honduras.

In the Tring Museum 1 ♂ from Yucatan (received from Messrs. Standinger and Bang-Haas).

95. *Papilio anchisiades* Esp. (1788).

Papilio Eques Trojani anchisiades Esper, *Aust. Schmett.* p. 53. n. 22. t. 13. fig. 1. ♂, 2. ♀ (1788).
Papilio pompeius, Kirby (non Fabricius, 1781, err. det.), *Cat. Diurn. Lep.* p. 538. n. 144 (1871) (*partim*).

♂♀. Hindwing comparatively shorter in the costal region and longer abdominally than in *P. isidorus* and *P. rhodostictus*; tail absent or short, always broader than in the species mentioned, but in one of our Bolivian females fully as long as in those insects. Markings very variable individually and geographically. The white markings of underside of forewing form occasionally a discal and a submarginal band.

Genitalia: ♂. Harpe always denticulate, the number of teeth quite variable individually.—♀. A long curved channelled process at proximal side of vaginal orifice; laterally a broad multidentate lobe, and further proximad a high ridge, the posterior surface of which is concave, shell-like.

Early stages several times described and figured: see below.

Hab. Mexico to Southern Brazil.

Three subspecies.

The name *pompeius*, proposed by Fabricius for *panthonus* Cramer, was meant to supersede this earlier name. Why Kirby has applied this Fabrician name to the present insect we do not know; it was perhaps a mere oversight.

a. *P. anchisiades idaeus* Fabr. (1793).

Papilio Eques Trojani idaeus Fabricius, *Ent. Syst.* iii. 1. p. 16. n. 48 (1793) ("Madras," Drury; Jones's fig.).

Papilio idaeus, Donovan, *Ins. Ind.* t. 18, fig. 2 (1800) ("Madras"); Godart, *Enc. Méth.* ix. p. 32. n. 20 (1819); Donovan, ed. Westw., *Ins. Ind.* p. 32. t. 19. fig. 2 (1842) ("Madras"); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 63. n. 279 (1852) (*partim*; Mexico; Honduras); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 312. n. 316 (1864) (*hab.?*); Butler, *Cat. Diurn. Lep. descr. Fabric.* p. 247. n. 48 (1869) (Honduras); id. & Druce, *Proc. Zool. Soc. Lond.* p. 365. n. 382 (1874) (Costa Rica).

Papilio ideus (?), Boisduval, *Spec. Gén. Léop.* i. p. 299. n. 132 (1836) (South America?).

Papilio anchisiades var. a, Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 63. sub n. 280 (1852) (Honduras); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 73. sub n. 296 (1856) (Honduras).

Papilio idaeus var. a, id., *l.c.* p. 72. sub n. 295 (1856) (*partim*; Mexico).

Papilio pandion Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 338 (1861) (Mexico; Honduras; *nom. indescr.*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 311. n. 315 (1864) (*nom. indescr.*; Mexico; Honduras); id., *Reise Novara. Lep.* p. 79. n. 61 (1865) (Mexico); Butl. & Druce, *l.c.* p. 365. n. 381 (1874) (Costa Rica); Staud., *Exot. Taqf.* p. 16 (1884) (Central America); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 230. n. 62. t. 70. fig. 6. 7. ♂, 11. genit. (1890) (Mexico to Panama).

Papilio anchisiades var. *pandion* Bates, *Proc. Zool. Soc. Lond.* p. 242. n. 5 (1863) (Panama).

Papilio anchisiades, Weidemeyer, *Proc. Ent. Soc. Philad.* ii. p. 146 (1863) (Central America).

Papilio ceander, Oberthür, *Et. d'Ent.* iv. p. 80. n. 257 (1880) (*partim*; Mexico).

Papilio capys var. *pandion*, id., *l.c.* iv. p. 80. sub n. 258 (1880) (Mexico).

Papilio pompeius var. *pandion*, Schaus, *Papilio* iii. p. 187 (1883) (descr. of adult larva, pupa; on Orange and Japote Blanco).

Papilio pandonius Staudinger, *Iris* vii. p. 104. note (1894) (*nom. nov. loc. pandion* Feld. *non* Wallace).

♂♀. Forewing: a buffish white patch in apex of cell, either above and below or only below, often vestigial; on *underside* the disc in male usually buffish white from M¹ forward, no spot behind M¹ or only a trace of it, rarely a distinct spot M¹—M², this spot being sometimes found in specimens which bear a cell-patch on upperside; the buffish white patches larger in female, the row often extending backwards to SM², there being submarginal bars distally of the patches in many

individuals.—Hindwing somewhat variable in shape, being proportionally shorter in some specimens than in others; the two rows of red spots on *underside* are sometimes widely separated and small, such individuals resembling rather closely non-tailed specimens of *P. pharnaces*, but are recognisable by the more proximal position of the anterior row of spots, by the paler colour of the spots R²—M² of the distal row, and by the marginal spots being entirely white or buffish white, not being marked with rufous-tawny; the cell frequently with a red apical dot, especially often in females.

Jones's figure represents a female of the present subspecies.

Hab. Mexico to Panama.

In the Tring Museum 80 ♂♂, 60 ♀♀, from : Mexico (Sallé); Jalapa, April and June 1896 (W. Schaus); Hnatumco; Cordoba, June 1904, 2800 ft. (A. Hall); Guatemala (Salvin); Mazatenanga, W. Guatemala, 1000 ft., September 1904 (A. Hall); Amatitlan, W. Guatemala, 4800 ft., August 1904 (A. Hall); San Pedro Sula, Honduras; San José, Costa Rica, 4000 ft. September 1904 (A. Hall); Carreblanco, Costa Rica (Lankester); Escazu, Costa Rica, August—September 1903 (Underwood); Alahueta, Costa Rica, 4100 ft., September 1904 (A. Hall); Bagava, Chiriqui, 800 ft. (Watson); Boquete, 2500 ft. (Watson); Parida I., January 1901 (Beck).

b. P. anchisiades anchisiades Esp. (1788).

Merian, *Surin. Ins.* t. 17 (1705).

Papilio Eques Trojanus anchises Linné, *Syst. Nat.* ed. x. p. 460. n. 10 (1758) (*partim*; sub citat.); Cram., *Pap. Erot.* iv. p. 58. t. 318. fig. A. B. C (1780) (Surinam, ♂ ♀); Jabl. & Herbst, *Naturs. Schmett.* ii. p. 24. n. 15. t. 9. fig. 1. 2. 3 (1784) (synon. *partim*); Stoll, in Cram., *l.c. Suppl.* p. 3. t. 1. fig. 2. larva (1787); Fabr., *Mant. Ins.* ii. p. 4. n. 28 (1787) (*partim*; sub citat.); Gmelin, *Syst. Nat.* i. 5. p. 2230. n. 11 (1790) (*partim*); Fabr., *Ent. Syst.* iii. 1. p. 13. n. 40 (1793) (*partim*).

Papilio Eques Trojanus anchisiades Esper, *Aust. Schmett.* p. 53. n. 22. t. 13. fig. 1. ♂, 2. ♀ (1788).

Papilio dominans anchises, Hübner, *Samml. Erot. Schmett.* i. t. 119. fig. 1. 2. ♂ (1806—?).

Priamides hipponous id., *Verz. bek. Schmett.* p. 87. n. 896 (1818?) (nom. nov. loco *anchises* Cram.).

Papilio archelaus Godart, *Enc. Méth.* ix. p. 32. n. 19 (1819) (= *anchises*, Cram.; Guyane; "Brazil" alia subsp.); Lacord., *Ann. Soc. Ent. Fr.* ii. p. 385 (1833) (larva on orange, social, large numbers; Stoll's fig. exact).

Papilio anchises, Constable, *Miscell. Butt.* p. 141. t. 14 (1832) (Surinam).

Papilio anchisiades, Boisduval, *Spec. Gén. Lép.* i. p. 279. n. 103 (1836) (= *archelaus* = *anchises*, Cram.; Guyane); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Pará; forest); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 73. n. 296 (1856) (*partim*; Santarem); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 338 (1861) (Amazons); Bates, *Journ. Entom.* i. p. 225. n. 10 (1862) (common throughout the Amazons; larva on the [imported] orange-tree; approach to "var. *isidorus*" at Ega); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 311. n. 313 (1864) (Surinam; Cayenne; Amazons); Guenée, *Ann. Soc. Ent. France* p. 308 (1867) (fig. of Merian quoted by Linné under *anchises* is *anchisiades*); Druce, *Proc. Zool. Soc. Lond.* p. 246. n. 15 (1876) (Peru); Dew., *Arch. Naturg.* xlv. 1. p. 1 (separ.) (1878) (larva, pupa); Hopff., *Stett. Ent. Zeit.* xl. p. 52. n. 22 (1879) (*partim*; Surinam, Peru); Ernst, *Ent. Nachr.* xii. p. 79 (1886) (pupa); Caracc., *Ent. Neues* ii. p. 52 (1891) (larva); Lathy, *Trans. Ent. Soc. Lond.* p. 69. n. 37 (1904) (Cayenne, ♂ with the patches of the hindwing blue instead of red).

Papilio anchisiades var. *isidorus*, Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 338 (1861) (Ega).

Papilio theramencus Felder, *Wien. Ent. Mon.* v. p. 74. n. 9 (1861) (Caracas, Venezuela, ♀); id., *Verh. Zool. Bot. Ges. Wien* xiv. p. 311. n. 314 (1864) (Venezuela; Bogota); id., *Reise Novara, Lep.* p. 78. n. 60 (1865) (♂ ♀; Colombia; Venezuela); Butl., *Ann. Mag. N.H.* (4). xx. p. 127 n. 61 (1877) (Cayaria, Peru); Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 126. n. 239 (1880) (Sta. Marta); Habel, *Iris* iii. p. 194 (1890) (Mérida); id., *l.c.* p. 203 (1890) (Valera); Michal, *ibid.* vii. p. 213 (1894) (Sao Paulo de Olivença).

Papilio pompeius var. a. *P. anchisiades*, Kirby, *Cat. Diurn. Lep.* p. 538. sub n. 144 (1871) (Guiana; Amazons).

- Papilio pompeius* var. *b. P. theramenes*, Kirby, *l.c.* p. 539. sub n. 144 (1871) (Venezuela; Colombia).
Papilio pompeius var. *anchisiades*, Möschler, *Verh. Zool. Bot. Ges. Wien* xxvi. p. 296 (1877) (Surinam).
Papilio pompeius var. *theramenes*, Staudinger, *Exot. Tugf.* p. 16. t. 11. ♂ (1884) (Amazons; northern S. America).
Papilio idaëus, Maass. & Weym., in Stübel, *Reisen S. Amer.*, *Lep.* p. 31. n. 133 (1890) (Colombia);
id., *l.c.* p. 38. n. 32 (1890) (Popayan).
Priamides pompeius, Kirby, in Allen's *Nat. Libr.*, *Lep. Butt.* ii. p. 284 (1896).
Priamides anchisiades, id., in Hübner, *Samml. Exot. Schmett.* ed. ii. p. 98. t. 119. fig. 1. 2 (190-?)
 ("anchisses!, archalaus!" laps. typ.).
Papilio pompeius, Kaye, *Trans. Ent. Soc. Lond.* p. 207. n. 197 (1904) (Trinidad; "anchisiades and theramenes bred from the same batch of eggs").

♂ ♀. Both sexes dichromatic, the differences being neither local nor seasonal, the forms completely intergrading, and each varying again considerably in the details of the pattern.

In the specimens named *anchisiades* by Esper and *theramenes* by Felder the forewing bears two white patches M¹—SM² on the disc, either on both sides or on underside only. These patches are very variable in size. There is on *underside* often a patch in cell and also frequently a spot before M¹ and a second before R³, the spot R³—M¹ being occasionally also present on *upperside*. The posterior fringe-spots of the hindwing are usually not much reduced.

In a smaller proportion of specimens the basi-discal area of the forewing is much deeper brown-black than the apex of the cell and the disc beyond, the pale area widening costad, bearing on the *underside* a row of white patches, of which the discal ones are either in the same position as in the Brazilian *P. a. capys*, which these specimens closely resemble, or are more proximal. The posterior marginal spots of the hindwing are usually very small in these specimens.

Hab. Colombia to Pará, southward to Bolivia; common everywhere.

In South-Eastern Bolivia the majority of specimens agree with the following subspecies.

In the Tring Museum 160 ♂♂, 70 ♀♀, and a series of larvae and pupae.

c. P. anchisiades capys Hübner. (1806—?).

- Papilio dominans capys* Hübner, *Samml. Exot. Schmett.* i. t. 120. fig. 3. 4. ♀ (1806—?).
Priamides capys id., *Verz. bek. Schmett.* p. 87. n. 897 (1818 ?); Kirby, in Hübner, *Samml. Exot. Schmett.* ed. ii. p. 98. t. 120. fig. 3. 4. t. 325. fig. 1. 2 (190-?).
Papilio erander Godart, *Enc. Méth.* ix. p. 32. n. 18 (1819) (Brazil); Boisdu, *Spec. Gén. Léop.* i. p. 277. n. 101 (1836) (Brazil; = *capys*); Swains., *Zool. Illustr.* iii. t. 101 (1822) (Brazil); Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vii. p. 47 (1838); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 312. n. 317 (1864) (Brazil); Jones, *Proc. Lit. Philos. Soc. Liverpool* p. 43. n. 38 (1883) (larva, pupa); Meldola, *Proc. Ent. Soc. Lond.* p. 24 (1883) (larva gregarious).
Priamides evander, Hübner, *Samml. Exot. Schmett.* ii. t. 112 (1822 ?).
Papilio hipponous, Ménétriés, *Mém. Soc. Imp. Moscou* vii. p. 188. n. 5 (1829) (Brazil, larva).
Papilio idaëus, Doubleday (*non* Fabricius, 1793, err. det.), *List Lep. Ins. Brit. Mus.* i. p. 11 (1845) (Brazil; *synon. partim*); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 19. n. 219 (1847) (Brazil; = *evander* = *capys*); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 63. n. 279 (1852) (*partim*; Brazil); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 72. n. 295 (1852) (*partim*; Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 5. n. 85 (1857) (Brazil); Maass. & Weym., in Stübel, *Reisen S. Amer.*, *Lep.* p. 91. n. 38 (1890); Bönningh., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 27 (1896) (Rio de Janeiro, common).
Papilio idaëus var. *a. Papilio pompeius*, Gray (*non* Fabricius 1781, err. det.), *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 63. sub n. 279 (1852) (Brazil); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 73. sub n. 295 (1856) (*partim*; Brazil).
Papilio anchisiades, id., *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 63. n. 280 (1852) (Brazil "var. a." alia *subsp.*); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 73. n. 296 (1856) (*partim*; Brazil).

Papilio pompejus. Capronnier, *Ann. Soc. Ent. Belg.* xvii. p. 8. n. 2 (1874) (Paquetá, Aug.); Staud., *Exot. Tagf.* p. 16 (1884) (Brazil); Seitz, *Stett. Ent. Zeit.* li. p. 98 (1890) (Coreovado); Weym., *Stett. Ent. Zeit.* lv. p. 315. n. 11 (1895) (Rio Grande do Sul); Mabilde, *Guia Pract. Borbol. Rio Grande do Sul* p. 45 (1896).

♂ ♀. Forewing without white patches on *upperside*, bearing always a pale band which widens costad, its inner edge crossing cell at or just beyond base of R^3 ; this band emphasized on *underside* by a row of white patches, one of which occupies apex of cell in all specimens.—Tooth R^3 of hindwing often projecting.

Hab. Plains of Eastern Bolivia; North Argentina; Paraguay; and Brazil.

In the Tring Museum 64 ♂♂, 26 ♀♀, from: Sapucay, Paraguay (W. Foster); Yhu, E. Paragnay (Audeer); La Soledad, Entre Ríos (Chas. Britton); R. Grande do Sul; Castro, Paraná (E. D. Jones); Bahru, S. Paulo (Dr. Hempel); Petropolis, Tijuca, Rio de Janeiro (Foetterle; E. May); Minas Geraës (Kennedy); Ceará.

96. *Papilio isidorus* Doubl. (1846).

Papilio isidorus Doubleday, *Ann. Mag. N. H.* xviii. p. 375 (1846) (Bolivia).

♂ ♀. Forewing below without a buffish white patch across the cell, the discal patch just entering cell in most males, being absent from other males and from the female (only one seen); the male bearing usually a buffish white discal patch also on *upperside*, the patch being here much smaller than below and much shaded with black.—The last red spot of the submarginal row of the hindwing stands distally of the large spot which is at its discal side. Hindwing much shorter posteriorly than in *P. anehisiades*, tail more or less distinct, narrow.

Genitalia: ♂. Harpe non-dentate, its dorsal edge more strongly rounded near the apical process than the ventral edge.

Early stages not known.

Hab. Chiriqui to Bolivia.

The geographical forms are not quite constant.

As previous authors did not strictly distinguish *P. isidorus* from *P. rhoelostictus*, we have discarded all references which appear doubtful.

a. P. isidorus chironis subsp. nov.

♂. Forewing, *upperside*, with buffish white spots R^2-M^2 , the first one minute, the third not quite reaching M^2 , a small spot in cell; on *underside*, these patches all large, the cell-spot being the smallest, the triangular spot R^2-R^3 coming next in size, while patch R^3-M^1 is the largest, being about twice as long as broad.—Hindwing, *above*, with the two red spots R^2-R^3 merged together; discal spots R^3-M^2 of *underside* well marked, not separate from the submarginal ones.

Hab. Chiriqui.

In the Tring Museum 1 ♂ (received from Messrs. Standinger & Bang-Haas).

b. P. isidorus brises subsp. nov.

♂. Forewing, *underside*, with greyish white spots R^3-M^2 or R^2-M^2 , upper spot small; no spot in cell.—Hindwing, *above*, with two red spots R^2-M^1 , the proximal (= discal) portion of spot R^2-M^1 about as large as the distal (= submarginal) portion; on *underside* the discal portions of spots R^3-M^2 standing separate from the submarginal ones, small, vestigial.

Hab. Bogota; probably the Magdalena valley.

In the Tring Museum 2 ♂♂.

c. P. isidorus flavescens Oberth. (1880).

Papilio isidorus var., Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 64. sub n. 281 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 73. sub n. 297 (1856) (hab.?).

Papilio isidorus var. *flavescens* Oberthür, *Et. d'Ent.* iv. p. 79. sub n. 254 (1880) (Colombia).

Papilio isidorus var. *leucostictus* Honrath, *Berl. Ent. Zeitschr.* xxix. p. 276 (1885) (Colombia); Maass & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 31. sub n. 134 (1890) ("Bogota"); Dognin, *Lép. Loja* p. 37 (1891).

(?) *Papilio ceus* "Boisd.," Dognin, *l.c.* i. p. 15 (1887) (*nom. nud.*).

Papilio isodorus, Maassen & Weym., *l.c.* p. 77. n. 33 (1890) (Rioja to Moyobamba).

♂. Forewing, *underside*, the white patch reduced.—Hindwing usually with one spot in cellule R^2-R^3 on upperside; this spot as well as the next one mostly white, either on both sides or only on one side of the wing; discal portion of spots R^3-M^1 of underside separate from the distal (= submarginal) portion, or obliterated.

♀. Forewing above and below paler brown distally in cell and beyond than in basi-discal area; on *underside* a row of ill-defined white submarginal spots from R^3 to SM^2 .—Hindwing above and below with the basi-discal area paler than in male; submarginal patches R^3-M^2 much enlarged, white; four submarginal spots $C-R^3$, the fourth white, the others more or less reddish, almost entirely rufous red on underside, a rufous red anal submarginal spot; five discal spots, small or vestigial, spots R^3-M^2 being merged together with the large white patches; tail short, acute.

Hab. Colombia (probably the south-east); Eastern Ecuador; North Peru.

In the Tring Museum 8 ♂♂, 1 ♀, from: Archidona, April 1899 (W. Goodfellow); Coca, R. Napo, May—July 1899 (W. Goodfellow); Mirador, February 1899; Zamora (O. T. Baron); Loja.

In coll. Oberthür from: "Bogota"; Ambato; Archidona; Moyobamba.

d. P. isidorus isidorus Doubl. (1846) (Pl. VIII. fig. 56).

Papilio isidorus Doubleday, *l.c.* (1846) (Bolivia); id., *List Lep. Ins. Brit. Mus.* i. *Append.* p. 3 (1848); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 63. n. 281. t. 7. fig. 4. ♂ (1852) (Bolivia); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 73. n. 297 (1856); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 312. n. 320 (1864) (*partim*); Druce, *Proc. Zool. Soc. Lond.* p. 246. n. 16 (1876) (Pozuzo); Hopff., *Stett. Ent. Zeit.* xl. p. 53. n. 23 (1879) (distinct from *anchisiades*; *partim*; "Brazil," Peru, Bolivia); Haase, *Untersuch. Mimicry* i. p. 99 (1893); Weeks, *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumani).

Papilio pompeius var. *e. P. isidorus*, Kirby, *Cat. Diurn. Lep.* p. 539. sub n. 144 (1871) (*partim*).

♂. Forewing, on *underside*, with white patch which nearly always enters the cell and is often vestigial also on *upperside*, some specimens, however, being without trace of this patch.—Red spots R^3-M^2 of hindwing, *above*, on the whole larger than in the previous form, two spots in cellule R^2-R^3 , separate from one another; on *underside* the small discal spots separate from the submarginal ones.

Hab. Eastern slopes of Bolivia and Peru, as far north as Huánuco.

In the Tring Museum 21 ♂♂ from: Pozuzo, Huánuco, 800—1000 m. (W. Hoffmanns); Chanchamayo (Schunke); Caradoc, Marecapata, 4000 ft., February 1901 (Oekenden); Peréné R., March 1900 (Simons); Palcazu (Sedlmayr); Cuzco, March 1901 (Garlepp); Mapiri.

97. *Papilio rhodostictus* Butl. & Druce (1874).

♂. *Papilio rhodostictus* Butler & Druce, *Proc. Zool. Soc. Lond.* p. 364. n. 370 (1874) (Costa Rica).

♂. In shape of the wings agreeing with *P. isidorus*. Forewing, either on both sides or only below, with a white patch across the cell near apex; on disc two white patches R^2-M^1 , always present *below*, but on *upperside* either both present, or the first, or the second, or both absent; on *underside* only an additional white streak behind M^1 .—Hindwing: spots R^2-M^2 larger than in *P. isidorus*, the discal and submarginal spots being confluent forming three large patches on *upperside*; seldom the two spots in cellule R^2-R^3 slightly separate, the line of separation, however, being often indicated; on *underside* the two spots R^2-R^3 mostly separated, nearer the cell than in *P. isidorus*, and therefore the submarginal spot R^1-R^2 much more distal than the spot R^2-R^3 .

♀. Similar to male, wings broader, markings larger.

Genitalia: ♂. Harpe more symmetrical than in *P. isidorus*, the dorsal and ventral edges being almost equally rounded near apical process.

Early stages not known.

Hab. Costa Rica to Western Ecuador.

a. *P. rhodostictus rhodostictus* Butl. & Druce (1874).

Papilio rhodostictus Butler & Druce, *l.c.* (1874) (Costa Rica); Kirby, *Cat. Diurn. Lep.* p. 814. n. 388 (1877); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 232. n. 67 (1890) (♂ ♀; Costa Rica; Chiriqui;—"Ecuador" alia subsp.).

♂ ♀. Cell-patch of forewing narrow, discal spot R^2-R^3 larger than spot R^3-M^1 , the latter sometimes absent from *upperside*, rarely larger than the preceding spot but then more or less shaded over with black.

Hab. Costa Rica; Chiriqui.

In the Tring Museum 3 ♂♂ from: Boquete, Chiriqui, 3500 ft. (Watson); Chiriqui.

b. *P. rhodostictus pacificus* subsp. nov. (Pl. VIII. fig. 49).

Papilio rhodostictus, Godman & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 232. n. 67 (1890) (*partim*; Ecuador).

Papilio paulson? *id.*, in Whympers, *Andes of Equator, App.* p. 109. n. 97 (1891) (west of Quito, with spot at end of cell of forewing).

♂ ♀. Forewing: cell-patch larger than in the preceding, discal spot R^2-R^3 smaller than R^3-M^1 , sometimes vestigial on *upperside*.

Hab. West Colombia and West Ecuador.

In the Tring Museum 24 ♂♂, 1 ♀, from: R. Dagua (Rosenberg), type; Paramba, W. Ecuador, 3500 ft., May—June 1897, dry season (Rosenberg); Lita, 3000 ft. (Flemming).

In coll. Oberthür a series of males from Juntas, R. Dagua.

c. *P. rhodostictus nymphius* subsp. nov. (Pl. VIII. fig. 48).

♂. Forewing without white spot on *upperside*; the markings of *underside* as in *P. r. pacificus*, but smaller.—The three patches of hindwing sometimes creamy white above and below, very often creamy white bordered with red, normally red above.

Hab. Central and Eastern Colombia, rather frequently found in Bogota collections.

In the Tring Museum 40 ♂♂ from : Muzo, July 1903 (M. de Mathan); Muzo (Lindig, coll. Felder); "Bogota."

IX. *Torquatus* Group.

Palpus yellow; breast yellow or spotted with yellow; abdomen for the greater part yellow, or at least with a yellow lateral line; both sexes tailed: the sexes different in colour; red discal spots of underside of hindwing round, not luniform, or the row represented by one or a few spots only; in male, cell of forewing below striped with yellow or entirely yellow, no bar across it.

Neuration: SC^2 of forewing at about one-third from SC^1 to SC^3 ; lower angle of cell much more obtuse than upper; D^2 longer than D^3 ; basal cellule of hindwing very little prolonged beyond PC, almost truncate; PC strongly arched.

Larva similar in colour to that of *P. androgeus*, with four rows of rather prominent tubercles.—Thoracical projection of pupa long.

Key to the species :

A. *Males*.

- a.* Band of forewing not broadly interrupted, the uppermost spot standing before SC^4 or in fork, separate from base of fork *b.*
 Band of forewing broadly interrupted, or continued to costal margin around apex of cell, uppermost spot at base of subcostal fork small, often absent, or the band quite short *d.*
- b.* Patch SC^5 — R^1 of band of forewing (second or third from apex) long, reaching beyond base of subcostal fork *c.*
 This patch smaller than the next, widely separate from base of fork Species No. 100.
- c.* Tail with yellow spot at apex Species No. 98.
 Tail without yellow spot at apex Species No. 99.
- d.* Band of forewing complete, extending from inner to costal margin, or interrupted *e.*
 Band abbreviated, extending from inner margin to about middle Species No. 103.
- e.* Band of forewing complete, consisting of a series of spots which are all separated from one another Species No. 104.
 Band either broadly interrupted at R^2 or continuous, the veins not black *f.*
- f.* Hindwing below with two orange-red spots behind M^2 , band of forewing always broadly interrupted Species No. 102.
 Hindwing below with one red spot behind M^2 , band of forewing often complete, tooth M^1 of hindwing as prominent as tooth M^2 Species No. 101.

B. *Females* (not known of several species).

- g.* Hindwing with a row of strongly arched submarginal spots, either on one side or on both *h.*

- Hindwing without curved submarginal spots, but with
two or three large patches R²—M² which touch cell *i*.
- h*. Tail with yellow spot at apex Species No. 98.
Tail without yellow spot at apex Species No. 100.
- i*. Hindwing crossed by a white band which extends to
abdominal margin Species No. 103.
Hindwing without such a band Species No. 102.

98. *Papilio himeros* Hopff. (1866).

♂. *Papilio mentor* Boisduval (non Dalman, 1823), *Spec. Gén. Lép.* i. p. 351. n. 193 (1836) (Brazil).
♀. *Papilio himeros* Hopffer, *Stett. Ent. Zeit.* xxvii. p. 26. n. 7 (1866) (Brazil).

Both sexes bear a yellow spot at the apex of the tail. Cell of forewing beneath yellow, at least not merely striped.

♂. Band of wings very broad, on hindwing extending beyond apex of cell ; on forewing a yellow spot distally of upper angle of cell.

♀. Band narrower than in male, and the patch SC⁵—R¹ of forewing much smaller ; no spot before upper angle of cell.—Submarginal spots of hindwing small, red, except upper two, which are yellow.

Genitalia : ♂. Tenth tergite non-spatulate. Harpe long, reaching close to apex of clasper, gradually tapering, being elongate-triangular, acute.—♀ not dissected.

Early stages not known.

Hab. Brazil.

Two subspecies.

a. P. himeros baia subsp. nov.

♂. Yellow band of wings a little narrower than in the following subspecies, the black distal area of hindwing nearly touching cell ; the additional spot before upper angle of cell of forewing small ; cell of forewing below brown, striped and washed with yellow ; yellow submarginal band of forewing below about half the width of the brown band situated at its proximal side ; submarginal spots of hindwing a little smaller than in *P. h. himeros*.

♀. Yellow band very much narrower than in the following form, on forewing much narrower than the brown distal border, not touching cell, on hindwing extending to apex of cell, the extreme tip of cell remaining brown, proximal edge of band crossing cell at point of origin of SC² and just proximally of M².

Hab. Bahia.

In the Tring Museum 1 ♂, 1 ♀.

b. P. himeros himeros Hopff. (1866).

Papilio mentor Boisduval, *l.c.* ; Donbl., *List Lep. Ins. Brit. Mus.* i. p. 17 (1845) (Brazil) ; id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 165 (1846) ; Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 38. n. 190 (1852) ; id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 52. n. 199 (1856) (Brazil) ; Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 305 (1864) (Brazil) ; Kirby, *Cat. Diurn. Lep.* p. 540. n. 151 (1871) (Brazil) ; Burm., *Descr. Rép. Argent. v. Lép., Atlas* p. 5. n. 6 (1879) (Corcovado) ; id., *l.c.* p. 61 (1879) (descr. of ♀) ; Oberth., *Et. d'Ent.* iv. p. 71. n. 214 (1880) (Brazil ; *types of mentor*) ; Staud., *Exot. Taqf.* p. 16 (1884) ; Haase, *Untersuch. Mimicry* i. p. 96, 100 (1893) ; Bönningh., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 27 (1896) (Santa Theresa, Rio de Janeiro, rare).

♀. *Papilio lycophron* var. *A.*, Boisduval, *l.c.* p. 352. n. 194 (1836) (*partim* ; "tail with yellow spot at apex").

- ♀. *Papilio himeros* Hopffer, *Stett. Ent. Zeit.* xxvii. p. 26. n. 7 (1866) (Brazil); Kirby, *Cat. Diurn. Lep.* p. 567. n. 336 (1871).
- ♀. *Papilio herodotus* Capronnier, *Ann. Soc. Ent. Belg.* xvii. p. 10. n. 14 (1874) (nom. indescr.; Batofogo, August); Oberth., *Et. d'Ent.* iv. p. 71. n. 215. t. 4. fig. 2 (1880) (Brazil).
- ♂. *Papilio lycophron* var. *minor*: *P. mentor*, Burmeister, *Descr. Rép. Argent.* v. *Lép.* p. 60. sub n. 2 (1878).

"Dalman a donné le nom de *Mentor*," says Boisduval, *l.c.*, "à un autre *Papilio* qui est le suivant, et qu'Hubner avait fait connaître avant lui sous le nom de *Lycophron*; nous avons cru pouvoir prendre sans inconvénient le nom de Dalman pour l'appliquer à celui-ci qui est nouveau." This is a mischievous practice to which also Fabricius adhered, causing much confusion.

The yellow band of the upperside touching cell on forewing and extending beyond tip of cell on hindwing, broader on forewing of both sexes than black marginal border. Some males with a vestige of a yellow spot in cell of forewing.

Hab. Brazil: Minas Geraës; Rio de Janeiro.

In the Tring Museum 5 ♂♂, 2 ♀♀, from Rio de Janeiro.

99. *Papilio lamarchei* Staud. (1892).

Papilio lamarchei Standinger, *Iris* v. p. 428 (1892) (Bueyes, Bolivia; *torquatinus* Esp. var.?).

♂. *Upperside*.—Forewing: yellow band narrower than in *P. himeros*, the apical spot absent, the next spot larger than in *P. himeros*, the black marginal border narrowing apicad; spot SC⁵—R¹ enlarged as in *P. himeros*, being much larger than in *P. hectorides*; no additional spot distally of upper angle of cell.—Hindwing even more strongly dentate than in *P. hectorides*, tail fringed with yellow, not bearing a yellow spot at apex, yellow band not extending to apex of cell.

Underside resembling that of *P. hectorides*, but more extended yellow.

♀ not known.

Genitalia: ♂. Harpe short, apex rounded and dentate.

Hab. Northern Argentina and Bolivia.

Nearest to *P. hectorides*, but approaching also a little *P. himeros*.

In the Tring Museum 11 ♂♂ from: Tucuman (J. Steinbach); Tapia, Tucuman (Baer); Bueyes; R. Tanampaya (Garlepp).

100. *Papilio hectorides* Esp. (1794).

- ♀. *Papilio Eques Trojani hectorides* Esper, *Magaz. Anst. Ins.* i. p. 5. t. 1. fig. 1 (1794); *id.*, *Aust. Schmetz.* p. 249. n. 115. t. 40c fig. 1 (1798) ("Ost-Indien").
- ♂. *Papilio Eques Achirus torquatinus* *id.*, p. 206. n. 94. *l.c.* t. 51. fig. 2 (1798) ("Surinam").
- ♂. *Papilio pandrosus* Godart, *Enc. Méth.* ix. p. 62. n. 101 (1819) ("Guyane"; Brazil); Swains., *Zool. Illustr.*, *Ent.* ii. t. 93 (1822) (Rio de Janeiro).
- ♀. *Papilio lysithous* Godart, *Enc. Méth.* ix. p. 73. n. 136 (1819) (Brazil); Lucas, *Lép. Exot.* p. 32. t. 16. fig. 2 (1835); *id.*, in Chenu, *Enc. Hist. Nat.*, *Pap.* i. t. 10. fig. 2. ♀ (1851-53).
- ♀. *Thoas lysithous*, Swainson, *l.c.* ii. t. 121 (1822) (Brazil).
- ♀. *Meneluides chirodamas* Hübn., *Samml. Exot. Schmetz.* ii. t. 103 (1822?).
- ♀. *Papilio hectorides*, Donovan, *Nat. Repos.*, *Ent.* t. 177 (1827); Boisduval, *Spec. Gén. Lép.* i. p. 303. n. 137 (1836) (Brazil); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 13 (1845) (Brazil); *id.*, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 180 (1846) (Brazil).
- ♂. *Papilio torquatinus*, Boisduval, *Spec. Gén. Lép.* i. p. 368. n. 212 (1836) (= *pandrosus*; Brazil); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 13 (1845) (Brazil); *id.*, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 143 (1846) (Brazil); Gray, *Cat. Lep. Ins. Brit. Mus.* i. p. 34. n. 165 (1852); *id.*, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 46. n. 173 (1856) (Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petr.*, *Lép.* i. p. 4. n. 52 (1857) (Brazil).

- ♀. *Papilio mezentius* Doubleday, *Ann. Mag. N. H.* xiv. p. 417 (1844) (West Coast of America); id., *List Lep. Ins. Brit. Mus.* i. p. 13 (1845); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 181 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 40. n. 295. t. 3. fig. 4 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 56. n. 216 (1856); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863) ("Mexico," errore); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 304 (1864); Kirby, *Cat. Diurn. Lep.* p. 540. n. 152a (1871) ("Amer. occ."); Wood, *Ins. Abroad* p. 549. fig. 299 (1883); Staud., *Exot. Tagf.* p. 16 (1884) ("perhaps a ♀ form from western (?) America").
- ♀. *Papilio argentus* Martyn, *Psyche* t. 14. fig. 3. 4 (1797) (ined.); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 40. n. 204 (1852) (♂ = *lysithous* Godt., ♀ = *argentus* Martyn—error, both ♀ ♀); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 56. n. 215 (1856) (Brazil).
- ♂ ♀. *Papilio argentus*, Felder, *l.c.* p. 310. n. 303 (1864) (♂ = *torquatinus*); Hopffer, *Stett. Ent. Zeit.* xl. p. 52. n. 20 (1879) (♀ = *hectorides*, ♂ = *torquatinus*; Brazil, Maxos in Bolivia).
- ♂ ♀. *Papilio hectorides*, Kirby, *Cat. Diurn. Lep.* p. 540. n. 152 (1871) (♀ = *argentus* = *chirodamus* = *lysithous*; ♂ = *torquatinus* = *pandrosus*); Caproun., *Ann. Soc. Ent. Belg.* xvii. p. 10. n. 15 (1874) (Itaipu, October); Staud., *Exot. Tagf.* p. 16. t. 11. ♂ ♀ (1884) (Brazil); Seitz, *Stett. Ent. Zeit.* li. p. 97 (1890) (Corecavado, common); Haase, *Untersuch. Mimicry* i. p. 97. t. 10. fig. 67. ♂, 68. ♀ (1893); Weym., *Stett. Ent. Zeit.* lv. p. 315. n. 13 (1895) (Rio Grande do Sul); Mabilde, *Guia Pract. Borbol. Rio Grande do Sul* p. 46. t. 1. fig. 3. ♂ (1896); Peters, *Illustr. Zeitschr. Ent.* ii. p. 52 (1897) (Nova Friburgo, both sexes black with white band, errore; larva, on *Anagyris foetida*?); Schröder, *ibid.* p. 485. fig. 1. 2 (1897) (l., p.); id., *l.c.* p. 497. fig. 3. 4 (♂, ♀) (1897).
- ♂ ♀. *Papilio torquatinus*, Burmeister, *Descr. Rép. Argent.* v. *Lép., Atlas* p. 5. n. 8 (1879) (larva and pupa; on a species of *Piperaceae*); Obertb., *Et. d'Ent.* iv. p. 78. n. 251 (1880) (Brazil); Gosse, *Entom.* xiii. p. 194 (1880) (Paraguay, Dec. to March); Bönnigh., *Verh. Ver. Naturw. Unterh. Hamburg* ix. p. 26 (1896) (common; larva on *Citrus* and *Piperaceae*).
- ♀. *Papilio torquatinus* aberr. ♀, *melania* Obertb., *Et. d'Ent.* iv. p. 78. sub n. 251. t. 3. fig. 3 (1880) (Brazil); Weym., *Stett. Ent. Zeit.* lv. p. 315. sub n. 13 (1895) (R. Grande do Sul).
- ♀. *Papilio hectorides* (!), Peters, *l.c.* ii. p. 51 (1897) (Nova Friburgo; larva; "♂ of *hectorides*," false).
- Troctides hectorides*, Kirby, in Hübn., *Samml. Exot. Schmett.* ed. ii. p. 97. t. 317. fig. 3. 4 (190-?) (Esper "1785" false).

The sexes dissimilar, the females being again dichromatic. The hindwing strongly dentate.

♂. *Upperside*: band almost gradually widening from apex of forewing to abdominal margin of hindwing, narrower than in *P. lamarchei*, varying somewhat in width and also in tint; many specimens with a spot before SC^5 , others being without it.—Hindwing: from one to six red spots on disc, the anal submarginal spot being also red.—Cell of forewing striped beneath.

♀. Band of wings, if present, white, usually not extending to abdominal margin of hindwing, stopping at M or at M^1 or M^2 ; on forewing somewhat different in position from the band of male, being nearly parallel to distal margin, slightly curving away from it anteriorly, crossing the subcostals just outside fork.—Submarginal spots of hindwing red, thin. Three colour-forms:

a'. ♀-f. *hectorides* Esp., *l.c.*; *mezentius* Doubl., *l.c.*; *argentus* Gray (ex Martyn), *l.c.*—Both wings with white band; the band in one of our specimens continued to abdominal margin of hindwing by means of two white spots which are merged together with the last two red spots of the discal series; the band very variable in width.

b'. ♀-f. *catamelas* nov.—Band vestigial on forewing, distinct on hindwing, but rather narrower than in ♀-f. *hectorides*.

c'. ♀-f. *melania* Obertb., *l.c.*—Band vestigial on both wings or absent.

Genitalia: ♂. Tenth tergite long, spatulate; sternite laterally with a ridge which is transversely divided into two short tubercles or teeth, the proximal one being long-hairy. Clasper emarginate ventrally at the apex; harpe long, flat, its ventral

margin nearly straight ; apex truncate, bearing several long teeth.—♀. Edge of the circular orifice raised in front to a very short glossy lip, the long process found in *P. torquatus* being absent ; on each side a little way from the orifice a large, variable, dentate lobe ; behind vaginal orifice rather strongly chitinised brown sclerite, this large plate posteriorly incised in the middle ; anal segment on innerside without the usual curved bristles or bearing only two rather thin ones (accessories in ovipositing).

Early stages described by Burmeister, *l.c.*, and figured by Schröder, *l.c.*

Hab. Brazil ; Paraguay.

In the Tring Museum 66 ♂♂, 45 ♀♀, from : Sapucay, Paraguay, all months from July to February (W. Foster) ; Ylu, Paraguay, September—December 1897 (Audeer) ; Bahia ; Minas Geraës, December 1898, February 1901 (A. Kennedy) ; Espiritu Santo ; Rio de Janeiro ; Corcovado ; Nova Friburgo ; Petropolis ; Sao Paulo ; Castro, Paraná (E. D. Jones) ; S. Catharina ; Blumenau ; Porto Alegre.

101. *Papilio garleppi* Stand. (1892).

♂. *Papilio garleppi* Staudinger, *Iris* v. p. 427 (1892) (S. Mateo, R. Juntas, Chaparé).

♂. *Upperside* : yellow band much broader than in *P. torquatus*, extending beyond apex of cell on hindwing.—Forewing, the band interrupted or not, the spots composing the costal portion large. Hindwing : tooth M^1 prominent, acute, longer than in *P. torquatus* ; the red anal spot preceded by two or three spots which are composed of dispersed yellowish buff and bluish white scales ; these spots on a level with the red anal one, corresponding to the bluish spots of the underside ; no red spots proximally of them.

On *underside* the hindwing bears a row of rufous red discal spots as in *P. torquatus*, but the spot behind M^2 is replaced by a tiny bluish dot, and spot M^1 — M^2 is the largest of the series ; the yellow submarginal spots are more or less luniform.

♀ not known. Standinger, when describing in 1892 a subspecies of *P. garleppi*, referred to the yellow-spotted female of *P. torquatus* figured by Gray (*P. patros* var.) as being possibly the female of *P. garleppi*. However, Gray's specimen is undoubtedly a female of *P. torquatus*.

Genitalia : ♂. Very different from those of *P. torquatus* ; tenth tergite very slender, long, curved ; sternite on each side with a curved, smooth ridge which is posteriorly produced into a tapering point, the ridges of the two sides curved towards each other, being hairy on innerside. Clasper emarginate ventrally at apex ; harpe ending in a long, sharp point, and bearing ventrally beyond middle a long pointed process.

Hab. Bolivia to the Upper Amazons.

Two subspecies.

a. P. garleppi interruptus Stand. (1892).

Papilio torquatus, Staudinger (*non* Cram., 1777, err. det.), *Exot. Tugf.* t. 11. ♂ (1884).

♂. *Papilio garleppi* var. *interruptus* id., *Iris* v. p. 427 (1892) (S. Paulo de Olivença, Shanusi, Chanchamayo ; “*patros* Gray perhaps ♀ of this insect”) ; Michael, *ibid.* vii. p. 209 (1894).

Band of forewing interrupted between R^2 and R^3 as in *P. torquatus*.

Hab. Upper Amazons ; Eastern Peru, as far south as Carabaya.

In the Tring Museum 3 ♂♂ from : La Union, R. Huacamayo, Carabaya, S.E. Peru, 2000 ft., December 1904 and January 1905, wet season (Ockenden).

b. *P. garleppi garleppi* Stand. (1892).♂. *Papilio garleppi* Staudinger, l.c.

Band of forewing not interrupted, but there is usually a more or less distinct vestige of an interruption.

Hab. Bolivia.

In the Tring Museum 6 ♂♂ from Mapiri.

102. *Papilio torquatus*.♂. *Papilio Eques Achivus torquatus* Cramer, *Pap. Exot.* ii. p. 123. t. 177. fig. A. B (1777) (Surinam).♀. *Princeps dominans caudius* Hübner, *Samml. Exot. Schmett.* i. t. 117 (1806—?).

Sexes very dissimilar, the female resembling certain females of *Aristolochia* Papilios, occurring like these in forests, while the male frequents more open localities. The female bears also a close resemblance to *P. isidorus* and *P. rhodostictus*, being, however, easily recognised by the colour of the spots on the thorax and the buffish line on each side of the abdomen.

♂. The band of the forewing is interrupted between R^2 and R^3 ; however, there is occasionally a spot in front of R^3 which is sometimes so large as to bridge over the gap, though not entirely filling it up. On the underside of the hindwing there is a discal row of five or six rufous red spots, variable in size, the last standing before abdominal margin proximally of the anal submarginal spot; of this row the fifth spot counted from behind is the largest in nearly every specimen.

♀. Wings brown-black. Forewing with or without white patches, in our only Bolivian specimen on underside a creamy buff, submarginal, ill-defined band.—Hindwing, on *upperside*, with a complete row of red submarginal spots and an incomplete row of red discal ones, the discal row extending from SM^2 forward to R^1 or R^2 ; the discal and submarginal spots R^3 — M^2 in the South American forms always merged together to large elongate patches, often also spots R^2 — R^3 forming together a third patch, these patches occasionally creamy on the Amazons, the development being on the same lines as in *P. isidorus* and *P. rhodostictus*; the rows of spots remaining separated in the Mexican form.

Genitalia: ♂. Tenth tergite spatulate, sternite on each side with a distally truncate ridge which is more strongly chitinised than the rest of the segment, the ridges of the two sides forming in dorsal view a pair of (). Clasper somewhat acuminate; harpe broad, widening distally, being widest a short distance from apex, the ventral edge almost straight, the dorsal edge slightly angulate, apex obtuse, the surface feebly concave, distally practically flat and longitudinally wrinkled, the edges apically densely denticulate, dispersed minute teeth also along the ventral edge.—♀. Edge of vaginal orifice raised proximally into a large obtuse process which is curved distad, being longitudinally impressed on the proximal surface, slightly tapering apically, the apex being truncate; behind the orifice a small rounded lobe densely covered with minute hairs; laterally of the vaginal process several low ridges connected with one another, no large dentate lobe as in *P. anchisiades* and *P. hectorides*.

Early stages described by Burmeister, *Descr. Rép. Argent.* v. Lép., *Atlas* p. 5. n. 7 (1879).

Hab. Mexico to South-East Bolivia, Paraguay, and Rio de Janeiro.

Six subspecies.

a. *P. torquatus tolus* Godm. & Salv. (1890).

Papilio tolus Godman & Salvin, *Biol. Centr. Amer., Lep. Rhop.* ii. p. 228. n. 59. t. 70. fig. 1. 2. ♂, 3. 4. ♀ (1890) (Tampico; Mexico); Haase, *Untersuch. Mimicry* i. p. 98 (1893).

♂. Band of forewing narrow, streak SC^5-R^1 long, streak R^1-R^2 short, a large spot R^2-R^3 , the gap in the band being narrow, some small spots at upper angle of cell.—Tail broad, submarginal spots large.

♀. No spots on forewing.—Hindwing with two separate rows of red spots, only spots R^3-M^1 connected with one another by some diffuse red sealing; tail long, spatulate.

Hab. Mexico.

b. *P. torquatus tolmidis* Godm. & Salv. (1890).

Papilio tolmidis Godman & Salvin, *l.c.* p. 229. n. 60. t. 70. fig. 5. ♂ (1890) (Panama; Bugaba, Chiriqui, Veragua).

♂. Forewing: band broader than in the preceding form, no spots before upper angle of cell or only minute ones; streak SC^5-R^1 longer than streak R^1-R^2 , patch R^2-R^3 present, the gap in the band being sometimes almost completely filled up.—Tail narrower than in *P. t. tolus*, very feebly spatulate.

Harpe slightly sinuate or incised dorsally.

♀ not known.

Hab. Panama: from Chiriqui southwards; Sevilla I.

May be expected to occur in Costa Rica.

In the Tring Museum 3 ♂♂ from: Chiriqui; Sevilla I., January 1902 (Batty).

c. *P. torquatus orchamus* Bois. (1836).

♀. *Papilio orchamus* Boisduval, *Spec. Gén. Lép.* i. p. 300. n. 133 (1836) (Colombia); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 192 (1846) (Colombia); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 44. n. 222. t. 7. fig. 6 (1852) (Venezuela); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 59. n. 235 (1856) (Venezuela); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 297 (1864) (Venezuela); Oberth., *Et. d'Ent.* iv. p. 79. n. 253 (1880) (Colombia, type).

♀. *Papilio torquatus* var. *c. P. orchamus*, Kirby, *Cat. Diurn. Lep.* p. 541. sub n. 154 (1871) (Venezuela).

♂ ♀. *Papilio orchamus*, Oberthür, *l.c.* p. 116. n. 253. t. 6. fig. 3. ♂ (1880) (Colombia); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 228. sub n. 59 (1890) (Colombia, Venezuela).

♂. *Papilio torquatus*, Hahnel, *Iris* iii. p. 201 (1890) (Valera, Venezuela).

♀. *Papilio torquatus* var. *orchamus*, Haase, *Untersuch. Mimicry* i. p. 98 (1893) (Venezuela).

♂. *Upperside*.—Forewing: yellow spots before upper angle of cell small, the spot before SC^{45} especially smaller than in most specimens from Guiana and the Amazons; patch SC^5-R^1 a little longer than the next spot or distally on a level with it, some specimens approaching the preceding form, bearing a spot before R^2 like *tolmidis*.—Hindwing: submarginal spots usually clearly marked.

♀. Forewing: a patch across apex of cell; a discal patch R^3-M^1 , usually accompanied by a patch R^2-R^3 and a vestigial patch M^1-M^2 .—Four to six large red patches on hindwing, the last standing behind M^2 ; a rather large spot in cell; tail short, acute, non-spatulate.

Hab. Colombia; Northern Venezuela.

In the Tring Museum 28 ♂♂, 2 ♀♀, from: "Bogota"; Cananche, Cundinamarca, July 1903 (Mathan); Muzo, December 1896.

In coll. Oberthür a series of ♂♂ from Juntas, West Coast of Colombia; in one of these the upper streak of the subapical patch on the forewing is longer than the second, and there is also a spot before R^3 , the specimen resembling the preceding subspecies.

d. P. torquatus leptalea subsp. nov. (Pl. V. fig. 18).

♂. *Upperside*.—Forewing: spots at upper angle of cell minute; streak SC⁵—R¹ shorter than the next, tapering, both narrow, the second streak not extended to R²; band narrower than in all the other forms, being narrower than the black marginal area.—Hindwing: submarginal spots clearly marked; tail spatulate.

Underside.—Forewing: submarginal spots rather large, especially the double spot M²—SM².—Hindwing: apex of cell black at least as far as base of R¹ and M¹.

♀. Like the female of *P. t. orchamus*; spot R²—R³ of forewing and the cell-patch smaller; discal and submarginal spots R²—R³ of hindwing separate, discal patch M²—(SM¹) less enlarged.

Hab. Western Ecuador.

In the Tring Museum 1 ♂, 1 ♀ from Naranjas (O. T. Baron); Zaruma, 1000 m. vii. 1899 (Simons).

In coll. Oberthür several males from Chimbo and Balsapamba, a ♂ from the latter place being here figured (type of name).

e. P. torquatus torquatus Cram. (1777).

Seba, *Thesaur.* iv. p. 12. t. 7. fig. 21. 22. ♂ (1764).

♂. *Papilio Eques Achirus torquatus* Cramer, *l.c.*; Goeze, *Ent. Beytr.* iii. 1. p. 86. n. 65 (1779); Jabl. & Herbst, *Naturs. Schmett.* ii. p. 270 (1784); *id.*, *l.c.* iii. p. 175. n. 104. t. 45. fig. 5. 6 (1788); Esper, *Ausl. Schmett.* p. 148. n. 69. t. 39. fig. 1 (1793).

Papilio Eques Achirus pelaus Fabricius, *Spec. Ins.* ii. p. 4. n. 12 (1781) (*partim*); Jung, *Alphab. Verz. Schmett.* p. 91 (1792) (*partim*); Fabr., *Ent. Syst.* iii. 1. p. 5. n. 15 (1793) (*torquatus* quoted as syn. with ?).

Papilio Eques Trojannus pelaus, Gmelin, *Syst. Nat.* i. 5. p. 2228. n. 279 (1790) (*partim*).

♀. *Princeps dominans caudius* Hübner, *Samml. Erot. Schmett.* i. t. 117 (1806—?).

♂. *Heracles pelaus*, *id.*, *Verz. bek. Schmett.* p. 83. n. 853 (1818?) (*partim*).

♀. *Priamides caudius*, *id.*, *l.c.* p. 87. n. 895 (1818?).

♂. *Papilio torquatus*, Godart, *Enc. Méth.* ix. p. 62. n. 100 (1819) (Guyane;—"Brazil" alia subsp.); Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vii. p. 51 (1838).

♀. *Papilio caudius*, Boisduval, *Spec. Gén. Lép.* i. p. 301. n. 135 (1836) ("Brazil"); Doubl., Westw. & Hew., *Gén. Diurn. Lep.* i. p. 18. n. 191 (1846) ("Brazil"); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 42. n. 220 (1852) (Pará); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 256 (1854) (Amazons; gardens); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* 59. n. 233 (1856) (Pará; Villa Nova); Wood, *Ins. Abroad* p. 546. 547. fig. 296. 297 (1883) ("♂" false; "Java" false).

♀. *Papilio patros* Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 43. n. 221. t. 7. fig. 7 (1852) (Ega); Wall., *l.c.* p. 256 (1854) (Upper Amazons; forest); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 59. n. 236 (1856) (Ega); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 297. p. 358. n. 173 (1864) (Ega); Wood, *Ins. Abroad* p. 545. fig. 295 (1883).

♀. *Papilio patros* var. a, Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 43. sub n. 221. t. 7. fig. 8 (1852) (Ega).

♀. *Papilio patros* var. b, Gray, *l.c.* p. 43. sub n. 221. t. 7. fig. 5 (1852) (Ega).

♂. *Papilio torquatus*, Wallace, *l.c.* p. 255 (1854) (Amazons; gardens); Bates, *Natural. Riv. Amaz.* p. 52 (1864) (Pará, in street).

♂ ♀. *Papilio caudius*, *id.*, *Trans. Ent. Soc. Lond.* (2). v. p. 1 (1859) (this is the ♀ of *P. torquatus*; found a pair in copula); Butler, *ibid.* p. 146. n. 230 (1877) (Serpa, Amazons, April).

♂ ♀. *Papilio torquatus*, Bates, *Trans. Ent. Soc. Lond.* (2). v. 347 (1861) (*caudius* and *patros* ♀ ♀ of *torquatus*; *torq.* and *caud.* found in copula); *id.*, *Journ. Entom.* i. p. 228. n. 30 (1862) (Pará and Lower Amazons, abundant); ♀ var. *patros* Upper Amazons; Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 297 (1864) (Surinam, Amazons); Kirby, *Cat. Diurn. Lep.* p. 541. n. 154 (1871) (Surinam; Amazons); Oberth., *El. d'Ent.* iv. p. 78. n. 252 (1880) (*partim*); Cayenne; Amazons); Möschl., *Verh. Zool. Bot. Ges. Wien* xxxii. p. 304 (1883) (Surinam); Staud., *Exot. Tuff.* p. 16. t. 11. ♂ (1884) (Surinam; Cayenne; Amazons); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 228. sub n. 59 (1890) (Guiana; Lower Amazons); Hahnel,

Iris iii. p. 283 (1890) (Pebas); Haase, *Untersuch. Mimicry* i. p. 97 (1893); Michael, *Iris* vii. p. 213 (1894) (Sao Paulo de Olivença).

♀. *Papilio torquatus* var. a. *P. patros*, Kirby, *l.c.* (Upper Amazons).

♀. *Papilio torquatus* var. *flavida* Oberthür, *Et. d'Ent.* iv. p. 115. n. 252 (1890) (Teffé).

♂ ♀. *Papilio patros*, Godman & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 228. sub n. 59 (1890) (Upper Amazons).

♀. *Papilio torquatus* var. *flava*, Haase, *Untersuch. Mimicry* i. p. 98 (1893) (laps. cal.; "Pará" false).

♀. *Papilio torquatus* var. *caudius*, id., *l.c.* (Pará).

♀. *Papilio torquatus* var. *patros*, id., *l.c.*

There is in the Tring Museum from the old collection of Lennep a male which agrees with Cramer's figure, and is probably the type specimen. This figure has several characteristic features which are also found in that specimen. The band of the forewing is rather narrower than usually in the present subspecies, the spots at the upper angle of the cell are small; the submarginal spots of the hindwing, on upperside, are comparatively large, and the apex of the cell is more extended black on underside than is usually the case.

Since Bates's classical paper in 1861 the specimens from the Guianas and the Lower Amazons have generally been regarded as different from the individuals found on the Upper Amazons. The material examined by us does not bear out this opinion. However, we find that in the males from Bolivia and Peru there are usually only five red discal spots on the underside of the hindwing, while there are mostly six in the specimens from the Amazons and Guiana. Having unfortunately only one female from the former districts, we do not know whether its peculiarities are merely individual or geographical.

♂. The spots at the upper angle of cell of forewing are mostly larger than in the other subspecies; streak SC^5-R^1 shorter than the next, both being broad; the band broader than in *P. t. leptalea* and *orchamus*, varying from being half as wide again to twice the width of the black distal border.—Submarginal spots of hindwing usually much shaded with black.

Submarginal spots of forewing below generally thin.

♀. Tail slender, pointed, rarely somewhat spatulate. There are five principal forms; the markings of the hindwing individually variable in number and size.

a'. ♀-f. *theras* nov.—Forewing with cell-spot, which does not reach across cell; one or more white patches on disc, usually only patch R^2-M^1 well developed.—Surinam, Upper Amazons.

b'. ♀-f. *caudius* Hübn., *l.c.*—Forewing without cell-spot; one to three patches on disc, spot M^1-M^2 being usually the best developed, often alone present, sometimes no other patches than M^1-SM^2 .—The Guianas; Lower and Upper Amazons.

c'. ♀-f. *patros* Gray, *l.c.*—No white patch on forewing; patches of hindwing red.—Upper Amazons; Cayenne (coll. Oberthür).

d'. ♀-f. *flavida* Oberth.; *patros* var. b Gray, *l.c.*; *flava*, Haase, *l.c.*—Forewing without white spots; patches of hindwing creamy.—Upper Amazons: Ega.

e'. ♀-f. *cleolus* nov.—Forewing without white spots, but with a kind of submarginal buffish band on underside, consisting of short double streaks R^1-R^3 and a row of small spots R^3-SM^2 .—Bolivia (Mus. Tring).

Hab. Orinoco; Patao, Guiria; the Guianas; Amazons; Eastern slopes of Ecuador, Peru and Bolivia.

In the Tring Museum 34 ♂♂, 13 ♀♀, from: Patao, Guiria, August 1891; La Vuelta, Caura R., May 1903 (Klages); Surinam; Teffé, January 1905 (Mathan); Obidos (Mathan); Juhuty, April 1905 (Mathan); Itaituba; Iquitos; R. Cachaeco,

affluent of R. Huallaga (Stuart); Archidona, April 1899 (W. Goodfellow); Zamora (O. T. Baron); Peréné R., 3000 ft. (Watkins); Peréné R., March 1900 (Simons); Upper R. Toro, La Merced (Simons); R. Colorado, 2500 ft., September—October 1903 (Watkins & Tomlinson); Guanay, Mapiri, 1500 ft., August 1895 (Stuart); Saliuas, R. Beni, July 1895 (Stuart); Mapiri; Encuentra Grande, mouth of La Paz R., August 1895 (Stuart); Prov. Sara, S. Cruz de la Sierra (J. Steinbach).

f. P. torquatus polybius Swains. (1823).

- ♂. *Papilio torquatus*, Godart, *Enc. Méth.* ix. p. 62. n. 100 (1819) (Brazil—"Guyane" alia subsp.); Boisd., *Spec. Gén. Léop.* i. p. 367. n. 211 (1836) (Brazil); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 17 (1845) (Brazil); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 142 (1846) (Brazil); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 34. n. 164 (1852) (Brazil); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 46. n. 172 (1856) (Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petrop., Léop.* i. p. 3. n. 51 (1857) (Brazil); Prillw., *Stett. Ent.* xxvi. p. 130 (1865) (Corcovado).
- ♀. *Papilio polybius* Swainson, *Zool. Illustr., Ent.* ii. t. 94 (1823) (Minas Geraës); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 13 (1845) (Brazil); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 133 (1846) (Brazil); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 44. n. 223 (1852) (Brazil—var. a. alia spec.); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 59. n. 236 (1856) (Brazil—var. a. excl.); Ménétr., *l.c.* p. 5. n. 74 (1857) (Brazil).
- ♀. *Troilides tros* Hübner, *Samml. Exot. Schmett.* ii. t. 111 (1822?).
- ♀. *Papilio trojanus* Boissduval, *Spec. Gén. Léop.* i. p. 301. n. 134 (1836) (nom. nov. loco *tros* Hübn. nou Fabr.; Brazil).
- ♀. *Papilio tros*, Doubleday, *List Lep. Ins. Brit. Mus.* i. p. 13 (1845) (Brazil); Prillw., *Stett. Ent. Zeit.* xxvi. p. 129 (1865) (Corcovado).
- ♂ ♀. *Papilio polybius*, Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 297, p. 358. n. 172 (1864) (Brazil); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 228. sub n. 59 (1890) (South-Eastern Brazil); ♀ = *tros* = *trojanus*).
- ♂ ♀. *Papilio torquatus*, Lucas, in Chenu, *Enc. Hist. Nat., Pap.* i. p. 38. t. 6. fig. 1. ♂ (1851-53) (Brazil); Capronn., *Ann. Soc. Ent. Belg.* xvii. p. 9. n. 13 (1874) (Entre Rios, Sept.); Burm., *Descr. Rép. Argent. v. Léop., Atlas* p. 5. n. 7 (1879) (Rio de Janeiro; larva, pupa); Oberth., *Et. d'Ent.* iv. p. 78. n. 252 (1880) (*partim*; Brazil, ♀); Maass & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 91. n. 40 (1890); Bönningb., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 26 (1896) (common).
- ♂ ♀. *Papilio torquatus*, var. b. *P. polybius*, Kirby, *Cat. Diurn. Lep.* p. 541. sub n. 154 (1871). *Papilio torquatus* ♀ var. *polybius*, Haase, *Untersuch. Mimicry* i. p. 98 (1893).
- ♂ ♀. *Troilides torquatus*, Kirby, in Allen, *Nat. Libr., Butt.* ii. p. 283 (1897); id., in Hübn., *Samml. Exot. Schmett.* ed. ii. p. 97. t. 118. fig. 1. 2, t. 324. fig. 1. 2 (190—?).

♂. Forewing: the spots before upper angle of cell small; submarginal spots of underside rather large.—Hindwing: submarginal spots usually distinct, not or little shaded with black; cell below entirely or almost entirely yellow, the black spot in apex being on an average smaller than in *P. t. torquatus*; tail broad.

♀. Monomorphic. Forewing: a cell-patch and a large discal patch M¹—M², no spot R²—R³, but often a spot R³—M¹ and a streak behind M²; tail spatulate, rounded at tip.

Hab. Brazil: Paraguay; Matto Grosso.

In the Tring Museum 36 ♂♂, 16 ♀♀, from: Bahia; Minas Geraës (R. Haensch); Tijuca; Petropolis; Rio de Janeiro; Villa Maria to Diamantino, Matto Grosso, January 1897 (Adeer).

103. *Papilio tasso* Stand. (1884).

- ♀. *Papilio polybius* var. a, Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 44. sub n. 223 (1852) (hab.?)
- ♂ ♀. *Papilio tasso* Standinger, *Exot. Tagf.* p. 19. t. 13. ♂ (1884) (hab. ?, probably Brazil; ♀ Brazil).

♂. Forewing: band abbreviated, the subapical spots SC⁵—R² of *P. torquatus* being absent.—Hindwing: three yellow submarginal spots on *upperside*, farther away from margin than in *P. torquatus*.

♀. A broad white band from near R^3 of forewing to abdominal margin of hindwing; tail narrow, not spatulate; cell of forewing below with some yellow streaks.

Hab. Brazil.

104. *Papilio peleides* Esp. (1793).

Papilio Eques Trojanus pelaus?, Jablonsky & Herbst, *Naturs. Schmett.* ii. p. 265. n. 51. t. 19. fig. 1 (1784) (*partim*).

Papilio Eques Trojanus peleides Esper. *Aust. Schmett.* p. 150. n. 70. t. 39. fig. 2 (1793) (copy of Jabl.'s figure).

Papilio peleides, Boisduval, *Spec. Gén. Léop.* i. p. 366. n. 209 (1836) (artefact?); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 144 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 34. n. 166 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 47. n. 174 (1856) (S. America); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 310. n. 301 (1864) (hab.?); Kirby, *Cat. Diurn. Lep.* p. 541. n. 154a (1871) (spec. fict.?); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 228. sub u. 59 (1890).

Besides Jablonsky's figure and description there is no evidence of the existence of this insect. Jablonsky expressly states that the figure was carefully drawn from a specimen. The individual may have been an artefact, as suggested by Boisduval, but the figure does not give us that impression. Considering that of many American *Papilios* only very few specimens are known, it is quite conceivable that *P. peleides* has not been rediscovered, as is the case also with *P. tasso*, which was described from an old pair without precise indication of locality.

Hab. Presumably South America.

SUBSECTION D.

Palpus with a white (rarely yellow) dot, sometimes quite black. Frons black, or with a yellow *central* line, never yellow along eyes. Costal margin of forewing somewhat incassate, more or less dentate, the scaling of the edge easily rubbed off, with the exception of the *Zagreus Group*.

The *Zagreus Group* is a mimetic offshoot of this subsection, having acquired several peculiarities which render it difficult to give a general characterisation of the whole Subsection inclusive of the *Zagreus Group*. Apart from these mimics, the species of the present Subsection are generally strong-winged species with heavy neuration in the forewing. Black is the prevailing colour on the body and wings. The abdominal margin of the hindwing is clothed with long hairs in the males.

Key to the groups :

- A. Costal margin non-serrate; frons with yellow mesial line;
 abdomen for the greater part orange-yellow *Zagreus Group*.
- B. Costal margin almost smooth, the serration being vestigial. *Scamander Group*.
- C. Costal margin serrate. *Homerus Group*.

X. *Zagreus Group*.

Frons with yellow mesial line. Antenna long, very slender, with thin club, yellow, except proximally. Breast obliquely striped with yellow; abdomen orange-buff, with a black mesial stripe above and below, or only on one side. Distal margin of forewing convex, farthest point about R^1 , costal margin non-serrate; cell very broad, upper and lower angles obtuse; SC^3 usually before angle of cell; stalk SC^{4+5} very variable in length. Hindwing ovate, longest centrally; long-

hairy at abdominal margin in male; basal cell long and narrow, spur near its apex, SC near its base; SC² from before middle of cell. Tenth abdominal tergite of male bifurcate; harpe long, gradually tapering to a point, somewhat flexuose, similar in the three species. Spines on upperside of tibiae and tarsi few in number and short in both sexes.

Key to the species :

- a. Hindwing black for the greater part Species No. 107.
 Hindwing with large central orange area b.
 b. Hindwing with a black spot in cell and several around cell. Species No. 105.
 No such spots on hindwing Species No. 106.

105. *Papilio zagreus* Doubl. (1847).

Papilio zagreus Doubleday, *Ann. Mag. N. H.* xix. p. 174 (1847) (Venezuela); id., Westw. & Hew., *Gen. Diurn. Lep.* i. t. 1. fig. 1. ♀ (1847); iid., *l.c.* ii. p. 529 (1852); Gray, *Cat. Lep. Ins. Brit. Mus.* i. Pap. p. 8. n. 30 (1852) (Venezuela; "Quito" alia species); id., *List Lep. Ins. Brit. Mus.* i. Pap. p. 9. n. 33 (1856); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 349 (1861) (Ega, November, one example); id., *Journ. Ent.* i. p. 229. n. 35 (1862) (Upper Amazons); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 312. n. 322 (1864) (Bogota; Venezuela; Ega); Kirby, *Cat. Diurn. Lep.* p. 538. n. 142 (1871); Druce, *Proc. Zool. Soc. Lond.* p. 246. n. 17 (1876) (Pozuzo); Hopff, *Stett. Ent. Zeit.* xl. p. 53. n. 24 (1879) (N. Granada, Venezuela, Amazons, Bolivia); Oberth., *Et. d'Ent.* iv. p. 99. n. 312 (1880) (Guayaquil); Staud., *Erot. Tagf.* p. 15. t. 10. ♂ (1884) (South Peru to Venezuela); Dognin, *Lép. Loja* p. 15 (1887); Hahnel, *Iris* iii. p. 149 (1890) (San Estéban); Dognin, *l.c.* p. 37 (1891); Haase, *Untersuch. Mimicry* i. p. 94 (1893); Kirby, in Allen's *Nat. Libr., Lep. Butt.* ii. p. 284 (1896); Eimer, *Orthogen.* p. 209 (1897).

♂ ♀. In spite of the large area inhabited by this species there is no decided geographical variation. The individual variability in the size of the creamy and orange markings of the forewing and in the black spots of the hindwing being considerable, all the differences between specimens from northern and southern localities which may be discovered in a small series of individuals disappear when a larger number of specimens is compared. The only difference which approaches constancy is in the colour of the cell-bar of the upperside of the forewing, this bar being pure cream-colour in Colombian and Venezuelan males, rarely showing a trace of orange, while it is more or less orange at the discal end in the majority of the specimens from Ecuador, Peru and Bolivia. The black dorsal stripe of the abdomen is absent from the female; in one of our Ecuadorian males the black ventral stripe of the abdomen is wanting.

Genitalia: ♂. The proecesses of the tenth tergite long, similar to those of *P. bachus*, being much longer than in *P. ascolius*. Harpe long, very narrow, the apex being curved inwards.—♀. Lobe situated in front of the vaginal orifice short, rotundate-truncate; lateral flap very large; transverse fold or low ridge situated behind vaginal orifice continued laterad, disappearing on the inner side of the lateral flaps.

Early stages not known.

Hab. Venezuela, Colombia, southward to Bolivia.

In the Tring Museum 47 ♂♂, 1 ♀, from: Onaca, S. Marta, 2000 ft. (Chas. Engelke); Villavicencio to Monte Redondo, March—April 1897 (Dr. Bürger); Villavicencio to R. Ocoor, January 1897 (Dr. Bürger); "Bogota"; Zamora (O. T. Baron); Chanchamayo, Peru (Schunke); Pozuzo, Huánuco, 800—1000 m. (W. Hoffmanns); La Union, R. Huacamayo, Carabaya, 2000 ft., November 1904 (G. Oekenden); Reyes, R. Beni, August 1895 (Stuart); Guanay, Mapiri R., August 1895, 1500 ft. (Stuart).

106. *Papilio ascolius* Feld. (1865).

Papilio zagreus, Gray (non Doubleday, 1847, err. det.), *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 8. n. 30 (1852) (*partim*; Quito, in coll. Hewitson).

Papilio ascolius Felder, *Verh. Zool. Bot. Ges. Wien*, xiv. p. 312. n. 323 (1864) (nom. indescr.; Quito; Bogota); id., *Reise Novara. Lep.* p. 82. n. 63 (1865) (Bogota, ♂); Staud., *Exot. Tagf.* p. 15 (1884) (Ecuador; Colombia; Chiriqui).

♂ ♀. Differs from *P. zagreus* especially in the hindwing, the basi-discal area bearing no black patches in the cell and between R^1 and abdominal margin; besides the black subcostal streak, which is always present, the wing bears only one black discal spot SC^2-R^1 either on both sides or only below, this spot being absent from many specimens; the black distal border of the hindwing is usually broader than in *P. zagreus*, often touching cell, but in Panama individuals the border does not surpass in width that of *P. zagreus*. The abdomen of the female is on the back either entirely ochraceous or blackish brown, there being no sharply defined dorsal black mesial stripe as in the male.

Genitalia: ♂. The processes of the tenth tergite short, the dorsal lateral edge of the tergite irregularly dentate and sinuate, the two sides not being exactly identical; harpe flattened beyond middle and here broader than in *P. zagreus*, the apex straight, not curved inward.—♀. Lobe at vaginal orifice slightly acuminate, narrower and longer than in *P. zagreus*; lateral flap not so large as in that species, its posterior edge continuous with the low transverse ridge standing behind the vaginal orifice.

Early stages not known.

Hab. Chiriqui to Western Ecuador.

The four subspecies differ only in pattern, each form varying considerably. There are in a long series of species all intergradations from one subspecies to the other.

a. *P. ascolius zalates* Godm. & Salv. (1890).

Papilio zalates Godman & Salvin, *Biol. Centr. Amer., Lep. Rhop.* ii. p. 233. n. 68. t. 71. fig. 1. 2. ♂, 3. genit. (1890) (Chiriqui).

♂. *Upperside*.—Forewing: cell-patch more or less densely shaded with black; subapical cell-spot narrow; discal spots short, spot R^1-R^2 as large as the next one or larger; no spots R^3-M^2 at cell or only traces of them.—Hindwing: distal marginal border narrower than in the other forms; no black discal spot SC^2-R^1 .

Underside.—Hindwing, deeper orange than in the other forms; submarginal spots smaller; no black spot SC^2-R^1 .

♀ not known.

Hab. Panama; Chiriqui; Bugaba; Veragua.

In the Tring Museum 3 ♂♂ from Chiriqui.

b. *P. ascolius duguanus* subsp. nov.

♂. *Upperside*.—Forewing: basal cell-patch as in *zalates*, subapical cell-patch as in *zalates* or larger; discal spots as in *ascolius*, spot R^1-R^2 large, but much shorter than the next one; slight traces of spots R^2-M^2 at cell.—Hindwing: basi-discal area of the same colour as the spots of forewing, slightly washed with orange distally, but much less so than in the palest specimens of *ascolius*, agreeing in this character best with pale individuals of *rosenbergi* from West Ecuador; black subcostal streak broader than in *zalates* and *ascolius*, invading cell a little;

a large black discal spot SC^2-R^1 , almost touching the subcostal streak : creamy spots around apex of cell nearly as large as in *zalatos*.

Underside.—Basi-discal area of hindwing nearly as pale as above, orange-tawny at costal margin and distally ; black subcostal streak broader than in the other forms, washed out at the edges, entering cell ; black discal spot SC^2-R^1 triangular, larger than in the other subspecies.

Hab. West Colombia : Rio Dagua.

In the Tring Museum 2 ♂♂.

A long series of males in coll. Oberthür from Juntas, R. Dagua.

e. P. ascolius ascolius Feld. (1865).

Papilio ascolius Felder, *l.c.* (*partim* ; Bogota) ; Kirby, *Cat. Diurn. Lep.* p. 538, n. 142b (1871) ; Oberth., *Et. d'Ent.* iv. p. 99, n. 313 (1880) (Colombia) ; Staud., *l.c.* (1884) (*partim*) ; Eimer, *Orthogen.* p. 209 (1897).

♂. Basal cell-patch of forewing always clearly marked, subapical cell-patch narrow or broad, occasionally continuous with the basal patch posteriorly ; discal spot R^1-R^2 usually as large as the last discal spot, rarely a mere dot ; the discal spots very variable in size, in some specimens only one-third the size as in others ; the spots R^3-M^2 at cell never absent, but often small, sometimes joined to the discal spots.—Hindwing always orange in cell and beyond ; the orange spots around apex of cell very variable, spot R^2-R^3 often absent, sometimes both spots R^2-M^1 mere specks ; black discal spot SC^2-R^1 often vestigial, diffuse.

Underside.—The discal spots situated distally of cross-veins on forewing very rarely reduced to dots.—Basi-discal area of hindwing usually pale in middle, but sometimes the pale colour reduced to some traces situated at the black subcostal streak ; black discal spot SC^2-R^1 present in most specimens.

♀. A specimen in Mr. Godman's collection from Muzo. Abdomen black-brown above ; proximal cell-patch of forewing and patches between cell and hindmargin orange ; patches $R^3-(SM^1)$ extended to cell ; a broad streak along hindmargin.—Black subcostal streak of hindwing reduced.

Hab. Colombia : Magdalena valley ; Cordillera of Bogota.

In the Tring Museum 27 ♂♂ from : "Bogota" ; Muzo, December 1896.

d. P. ascolius rosenbergi Druce (1903).

Papilio zagreus, Gray, *l.c.* (*partim* ; "Quito").

Papilio ascolius Felder, *l.c.* (*partim* ; Quito).

Papilio rosenbergi Druce, *Ann. Mag. N. H.* (7). xii. p. 221 (1903) (Paramba).

♂. *Upperside*.—Forewing, subapical cell-patch large, more or less rounded distally ; spots R^3-M^2 situated at cell absent or well marked ; discal spot R^1-R^2 , which is nearly always large in the other forms, usually minute, sometimes absent, seldom as large as the last spot of the discal row ; discal spots R^2-M^1 usually longer than in the other subspecies ; submarginal spots R^1-SM^2 as a rule smaller than in the preceding form, often vestigial, the posterior ones being sometimes absent.—Hindwing, basi-discal area paler than in *ascolius*, usually hardly at all washed with orange, but sometimes more extended orange than in the palest specimens of *P. a. ascolius* ; width of black distal border as in *ascolius*, variable ; black discal spot SC^2-R^1 mostly absent.

Underside.—Subapical cell-patch of forewing rounded distally.—Basi-discal area of hindwing either pale in middle, or the pale colour marked only at the black subcostal streak ; discal spot SC^2-R^1 varying from black to tawny, often vestigial,

never absent : the black streak usually washed out at the edges ; submarginal spots small.

♀. Abdomen ochraceous above. Discal patches R^3-M^2 of forewing more proximal than in male ; spots $M^1-(SM^1)$ situated at cell large but ill-defined.

Hab. West Ecuador.

In the Tring Museum 11 ♂♂, 1 ♀, from : Paramba, 3500 ft., March, April and May 1897 ; and Chimbo, 1000 ft., August 1897 (W. Rosenberg).

107. *Papilio bachus* Feld. (1865).

Papilio bachus Felder, *Verh. Zool. Bot. Ges. Wien* xiv, p. 312, n. 324 (1864) (nom. indescr. ; Bogota) ; id., *Reise Novara, Lep.* p. 80, n. 62, t. 14, fig. a, b. ♂ (1865) (Bogota).

♂. The two cell-patches of the forewing are usually confluent behind, the black space at the costal side of the proximal patch being often reduced to a small subbasal streak ; the discal spots SC^3-R^2 are always present, the upper two being sometimes very small, the third reaching occasionally from cell halfway to outer margin ; three long patches from cell to near outer margin, the second and third often imperfectly divided into a proximal portion corresponding to the spots R^3-M^2 situated in *P. ascolius* and *zagreus* close to the cell, and a distal portion homologous to the discal spots of the allied species ; the submarginal series of spots usually absent from upperside, but occasionally the spots partly distinct partly vestigial, the last three spots R^3-SM^2 often represented by minute dots.—The hindwing is quite black, except a narrow band separating the basi-discal area from the marginal border, the latter being narrower than in the other species ; that orange band often reduced to some small spots ; creamy submarginal spots distinct ; the veins partly creamy in some specimens.

The *underside* is somewhat paler than the upper ; the hindwing is more extended tawny-orange, the black area being often divided up into patches by the veins being bordered with tawny. In one of our specimens of the southern subspecies (Pozuzo, Peru) the marginal band of the hindwing is creamy for the greater part, sharply defined spots situated in the middle of the cellules between the blue dots being black and therefore very conspicuous on the pale ground ; the same specimen bears on the forewing, above and below, ill-defined creamy streaks at the distal margin from SC^3 to R^3 , the first being the longest and most indistinct.

♀ not known.

Genitalia : ♂. Tenth tergite similar to that of *P. zagreus* ; the two apical projections long ; harpe also as in that species, a little broader beyond middle.

Hab. Colombia, Peru and Bolivia.

Two subspecies.

a. *P. bachus bachus* Feld. (1865).

Papilio bachus Felder, *l.c.* ; Kirby, *Cat. Diurn. Lep.* p. 538, n. 142a (1871).

♂. Markings of forewing pale above and below ; proximal cell-patch and posterior discal patches washed with orange ; discal streaks R^2-M^2 narrowed distally on upper- and underside ; vestiges of three submarginal spots SC^3-R^1 , the first spot standing distally of the fork.—Veins of hindwing partly creamy.

Apparently rare, at least in collections.

Hab. Colombia.

In the Tring Museum 3 ♂♂ from : "Bogota" (Lindig, type) ; Villavicencio to Monte Redondo, March—April 1897, beginning of rainy season (Dr. Bürger).

b. P. bachus chrysomelus subsp. nov.

Papilio bachus, Staudinger, *Exot. Tagf.* p. 15 (1884) (Peru); Weeks, *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumani, Bolivia).

♀. Basi-discal area of forewing orange above and below, more or less creamy yellow at costal margin; discal streaks R²—M² distally less acuminate on underside than in the preceding subspecies.

The individual variability is considerable. Some specimens have hardly any cream-colour on the upperside, while in others the costal half of the subapical cell-patch, the patches outside the short cross-veins and the distal portion of the streak R²—R³ are creamy. The amount of tawny orange on the hindwing is very variable.

Hab. Pern; Bolivia.

In the Tring Museum 24 ♂♂ from: Pozuzo, Huánuco, 800—1000 m. (W. Hoffmanns); Chanchamayo (Schunke; Hoffmanns); Montanas, R. Madre de Dios, September 1901 (Ockenden); R. Slucuri, S.E. Pern, June 1901, 2500 ft., dry season (Ockenden); La Union, R. Huacamayo, S.E. Peru, 2000 ft., November 1904, wet season (Ockenden); R. Songo to R. Suapi, Bolivia, 1100 m., March—June (Garlepp); Salinas, R. Beni, June 1895 (Stuart); Mushay, R. Beni, August 1895 (Stuart); S. Augustin, R. Mapiri, 3500 ft., September 1895 (Stuart); Charuplaya, May 1901, 1300 m., some rain (Simons).

XI. Scamander Group.

Dentition of costal margin of forewing vestigial.

Of all the species of Subsection D a member of the present group, namely *P. hellanichus*, appears to us to stand in pattern nearest the ancestral form. The mimetic *Zagreus Group* is probably an offshoot from some such insect as *P. hellanichus*.

The dentition of the costal edge of the forewing is very feebly developed, but on denuding the margin small teeth become visible, being especially distinct towards the base of the wing.

Key to the species:

- | | |
|---|------------------|
| a. A yellow band of spots across the upperside of both wings | b. |
| No yellow band on upperside | c. |
| b. Hindwing, upperside, with large yellow spot in cell, discal spots more or less orange distally | Species No. 108. |
| Band of hindwing, upperside, not entering cell, or cell-spot very small | Species No. 109. |
| c. Abdomen with large creamy side-band or patch | Species No. 111. |
| Abdomen black | Species No. 110. |

108. *Papilio hellanichus* Hew. (1868).

Papilio hellanichus Hewitson, *Exot. Butt.* iv. *Pap.* t. 9. fig. 27. 28 (1868) (Uruguay); Kirby, *Cat. Diurn. Lep.* p. 566. n. 323 (1871) (Uruguay); Oberth, *Et. d'Ent.* iv. p. 69. n. 196 (1880) (Brazil); Haase, *Untersuch. Mimicry* i. p. 92 (1893) (belongs to the "Machaon Group"); Eimer, *Arth. Verwaandtsch. Schmett.* ii. p. 138. t. 7. fig. 5. ♂ (1895) (near *P. americanus*); id., *Orthogen.* p. 37 (1897); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 272 (1897).

Papilio hellanicus (!) Hewitson, *l.c. Index* (1871).

Papilio cleotus, Burmeister (*non* Gray, 1832, *err. det.*), *Descr. Rép. Argent.* v. p. 61. n. 3 (1878) (mouth of R. Paraná; Entre Ríos; Resario; Gualaguaychu; Cordova; Las Conchas; *P. hellanicus*! sub syn.).

♂ ♀. With the exception of Burmeister, all authors have regarded this insect as a near relative of *P. americanus* and allies. However, it has nothing to do with the *Machaon Group*, the resemblance to those insects being quite superficial. We are astonished to find that the pattern of the upperside deceived even Haase, who in many other cases has shown such a keen insight in the true relationship of many species of *Papilio* over which other authors had blundered. *P. hellanichus* is in structure practically identical with *P. scamander*, and the close agreement in pattern will also become at once evident to every one who compares the underside of *P. hellanichus* with that of *P. scamander scamander*. In fact, *P. hellanichus* is nothing else but the most southern development of *P. scamander*; the two insects may be specifically distinct, as we believe they are, but are nevertheless very closely related. The patch in the cell of both wings gives the species an *americanus*-like appearance; but even these patches are nothing new in the species, as the cell-spot of the forewing occurs on the underside in *P. scamander*, while the hindwing of *P. scamander* often bears a small cell-spot on both sides.

Early stages not known.

Hab. Uruguay and the adjacent districts of Brazil and Argentina.

In the Tring Museum 10 ♂♂, 3 ♀♀, from: S. Isidor, north of Buenos Aires (Ruschewylh); La Soledad, Entre Rios, border of Uruguay, October, December, January (Chas. Britton); La Soledad, March and December (Miss E. A. Britton).

In coll. Oberthür from Zarate, January and February 1881 (Kinkelin), and a ♀ labelled "Brézil."

109. *Papilio scamander* Boisd. (1836).

Papilio scamander Boisduval, *Spec. Gén. Lép.* i. p. 363. n. 206 (1836) (Brazil).

♂ ♀. *Upperside*.—Forewing: costal edge practically non-serrate; no spot in cell; a curved discal row of rounded spots from costal to hinder margin; a submarginal row of much smaller spots from costal margin, not reaching to hinder margin.—Hindwing: a curved discal band of spots parallel to distal margin situated outside cell, often touching it, there being sometimes a small spot in cell, cream-colour or buff-yellow like the bands of the forewing; a row of submarginal spots, red or pale orange-buff, the first ones being sometimes cream-colour; tail thin, tooth M¹ produced, sometimes also tooth M².

Underside of forewing similar to upper, the cell bearing sometimes a spot at apex, and the submarginal spots being enlarged in one of the subspecies.—Hindwing: ground-colour either brown-black, or yellowish buff, or intermediate, the three subspecies being different in the colour and pattern of the wing.

Neuration: D² of forewing half the length of D³ or less; SC² of hindwing midway between base and R¹ or beyond middle.

Genitalia: ♂. Tenth tergite long, spatulate, the tip being rounded; upper edge of sternite strongly chitinised, smooth, bearing anally two processes, the anterior one being conical, pointed and proximally hairy, the posterior one being subcylindrical, feebly increasing in width apically. Harpe gradually widening from base, somewhat twisted, suddenly narrowed at apical third of clasper from the ventral side, ending in a slightly curved acute process, the ventral edge bearing one or more small teeth proximally of the apical process.—♀. In front of vaginal orifice a lanceolate, flat process, slightly irregular at the edges, carinate on the anterior surface; lateral edges of orifice feebly elevate, forming posteriorly together

a short, flattened, longitudinal ridge which bears a rounded tubercle behind the orifice, the tubercle being covered with extremely small hairs; the whole area at each side of the orifice brown, chitinised, the lateral edge being free, projecting; between this ridge and the postvaginal mesial ridge a deep groove in front of which there is a long, pointed, curved process.

Early stages several times described and figured; see literature under *grayi*.

Hab. Brazil.

Three subspecies.

a. P. scamander grayi Boisid. (1836).

Papilio grayi Boisduval, *l.c.* p. 365, n. 208 (1836) (Brazil); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 313, n. 338 (1836) (Bras. austr.); Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vii. p. 51 (1838); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 18 (1845); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16, n. 151 (1846); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 35, n. 171 (1852); Lucas, in Obenu, *Enc. Hist. Nat., Pap.* i. t. 16, fig. 2. ♂ (1853); Gray, *List Lep. Ins. Brit. Mus. i. Pap.* p. 47, n. 179 (1856) (Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petrop., Léop.* i. p. 4, n. 53 (1857) (Brazil); Vollenh., *Tijdschr. Ent.* iii. p. 87, n. 145 (1860) (Brazil); Kirby, *Cat. Diurn. Lep.* p. 537, n. 130 (1871); Burm., *Descr. Rép. Argent. v. Léop., Atlas* p. 5, n. 9, t. 2, fig. 4, 4a (1879) (larva, pupa; Nova Friburgo; Petropolis); Oberth., *Et. d'Ent.* iv. p. 74, n. 223 (1880) (*partim*; type); Jones, *Proc. Lit. Phil. Soc. Liverpool* xxxvi. p. 42, n. 45, t. 4, fig. 10 (1883) (larva; pupa; Sao Paulo); Bönningh., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 28 (1896) (not at Rio; common at Petropolis; larva on *Cunella* and *Magnolia*); Peters, *Illustr. Zeitschr. Ent.* ii. p. 52 (1897) (Bahia, rather common; larva, on *Laurus*).

♂ ♀. The row of submarginal spots of forewing not angulate; posterior discal spots larger than anterior ones.—Submarginal spots of hindwing red, sometimes several red spots on disc outside the yellowish buff band.

Basal area of *underside* of hindwing a little paler than forewing, but never washed with buff; a row of red spots distally of and separate from the creamy white discal band.

Hab. Bahia to Parana, southern specimens often similar to the next form.

In the Tring Museum 22 ♂♂, 10 ♀♀, from: Espiritu Santo; Petropolis, October 1897 and January 1898 (Foetterle); Sao Paulo; Castro, Parana (E. D. Jones).

b. P. scamander curymander Hopff. (1866).

Papilio curymander Hopffer, *Stett. Ent. Zeit.* xxvii. p. 29, n. 10 (1866) (Brazil); Kirby, *Cat. Diurn. Lep.* p. 567, n. 335 (1871).

Papilio grayi, Müller, *Kosmos* p. 187 (1878) (agreeable odour in ♂); id., *Trans. Ent. Soc. Lond.* p. 219 (1878) (variability); Oberth., *l.c.* (1880) (*partim*; Rio Grande do Sul).

♂ ♀. Discal band of forewing wider than in the preceding, of about even width throughout, or the anterior spots larger than the posterior ones; submarginal row of spots angulate, the upper two or three spots being more proximal than the others.—Band of hindwing on the whole more widely separate from cell; at least the upper submarginal spots creamy-yellow.

Forewing occasionally with spot in cell on *underside*.—Basal area of hindwing paler than in the preceding subspecies, often washed with buff; red discal spots smaller, closer to the band, often obsolete; the blue bars beyond them more distinct; submarginal spots paler. Abdomen sometimes spotted with buff at the sides.

Hab. Santa Catharina; northern districts of Rio Grande do Sul.

Intergrading with the next.

In the Tring Museum 6 ♂♂, 4 ♀♀, from: S. Catharina; Theresopolis, 800—1000 ft., November 1904 to February 1905 (J. Michaelis).

c. P. scamander scamander Boisd. (1836) (Pl. V. fig. 22).

Papilio scamander Boisduval, *l.c.* (Brazil); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 146 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 35. n. 168 (1852); Lucas, in Chenu, *Enc. Hist. Nat. Pap.* i. t. 16. fig. 1. ♂ (1851-3); Gray, *List Lep. Ins. Brit. Mus. Pap.* i. p. 47. n. 176 (1856); Lucas, in Casteln., *Voy. Amér. Sud, Ent.* p. 199. t. 1. fig. 2. ♂ (1857) (Interior of Brazil); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 313. n. 339 (1864); Kirby, *Cat. Diurn. Lep.* p. 537. n. 129 (1871); Oberth., *Et. d'Ent.* iv. p. 73. n. 222 (1880) (type).

Papilio grayi var. *scamander*, Mabilde, *Guia Pract. Borbol. Rio Grande do Sul* p. 45 (1896).

♂ ♀. Discal band of *upperside* more yellow than in the other forms; on forewing wider in front than behind, spots SC⁵—R² being the longest, the band posteriorly more distal than in the other two subspecies; submarginal row angulate.—Hindwing: submarginal spots buff-yellow, the posterior ones often washed with red.

Underside very different from that of the other forms.—Forewing: anterior submarginal spots enlarged to large patches which extend close to margin.—Hindwing: basal area the same creamy yellow colour as discal band, the veins remaining black; no red discal spots; blue crescents conspicuous; submarginal spots varying from being milky white to being red.

Hab. Rio Grande do Sul, some specimens agreeing closely with extreme specimens of *curymander*.

In the Tring Museum 2 ♂♂, 1 ♀, from Rio Grande do Sul.

110. *Papilio birchalli* Hew. (1863).

Papilio birchalli Hewitson, *Trans. Ent. Soc. Lond.* (3). i. p. 517 (1863) (Bogota).

♂. Abdomen black, claspers more or less creamy at sides. Costal edge of forewing practically non-serrate; some indistinct or small spots around apex of cell and a postdiscal and a submarginal row of spots creamy, the upper postdiscal spots more or less shadowy.—Hindwing: a broad creamy discal band, slightly greenish as all the markings of the *upperside*, narrowing behind, entering cell, the cell-spot varying in size, being sometimes very small; a submarginal row of olive-buff spots, between which and discal band there is occasionally another row of small spots; no tail, tooth R³ being very little longer than the other teeth.

On *underside* of forewing a greenish creamy cell-patch, and from lower angle of cell to hindmargin a row of greenish creamy patches; four submarginal spots from R³ backwards, sometimes a fifth vestigial.—Discal band of hindwing consisting of a rather large costal creamy spot and a similar subanal spot connected with one another by a row of minute red spots, some of which are often vestigial, spot M¹—M² being creamy; submarginal spots red, halfmoon-shaped, the first alone being usually straight, spot M¹—M² being the largest.

♀. Similar to male, but the markings of the *upperside* more bluish green and the discal band of the hindwing much wider. On the *underside* the costal spot of the discal band of the hindwing is red and smaller than in male, while the small intermediate spots are larger than in male.

Neuration: SC³ of hindwing at one-third (or a little beyond) from subbasal cellule to R¹.

Genitalia: ♂. Tenth tergite long and broad, spatulate; double process of sternite not deeply divided, the two projections short, the anterior one slightly more acuminate than the second; harpe very long, tapering, acute, dorsally angulate, and bearing between this angle and the apex many small teeth, the

apical portion of the harpe somewhat resembling a shark's tail.—♀. Edge of vaginal orifice anteriorly raised into a rather broad, deeply sinuate flap, each lobe of which is pointed; lateral edges of orifice continued beyond the orifice as a mesial double fold; behind the orifice a rounded, densely folded, tubercle, which is glabrous, bearing minute hairs only posteriorly at the base; in front of this tubercle, within the orifice, there is a transverse ridge; behind the orifice there is on each side of the double mesial fold a deep impression, at the side of which there stands a long, pointed, somewhat scythe-shaped process; the whole lateral area of the vaginal depression strongly chitinised, the edge projecting free, being continuous with the anterior surface of the sinuate vaginal flap.

Early stages not known.

Hab. Panama; Colombia; Argentina.

The last locality requires confirmation.

Two subspecies.

a. P. birchalli godmani snbspec. nov.

Papilio birchalli, Godman & Salvin, *Biol. Centr. Amer., Lep. Rhop.* ii. p. 237. n. 74. t. 71. fig. 8. 9. ♂. 10. geuit. (1890) (*partim*; Chiriqui; Bugaba).

This form stands in some collections as *godmani*; we fail to find the description, but accept the name.

♂. Discal band of upperside of hindwing posteriorly obsolete, anteriorly broader than the black distal marginal area.

♀. Discal band of hindwing very broad, including apical third of cell, posteriorly irrorated with black, the greenish scaling not being dense.

Genitalia: ♂. Harpe angulate at apical two-fifths.—♀. As described above.

Hab. Panama; Chiriqui; Bugaba.

In the Tring Museum 2 ♂♂, 1 ♀, from Chiriqui (received from Messrs. Staudinger & Bang-Haas).

b. P. birchalli birchalli Hew. (1863).

Papilio birchalli Hewitson, *l.c.* (Bogota); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 312. n. 327 (1864); Kirby, *Cat. Diurn. Lep.* p. 538. n. 139 (1871) (*partim*); Staud., *Escol. Tagf.* p. 15 (1884); Oberth., *Et. d'Ent.* xii. p. 3. t. 2. fig. 6. ♂ (1888) (Muzo); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 237. n. 74 (1890) (*partim*; Colombia; Cauca valley; R. Quarto, Cordova, Argentina); Maass & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 11. n. 39 (1890) (Colombia); Haase, *Untersuch. Mimicry* i. p. 94 (1893).

♂. Discal band of hindwing narrower than in the preceding, extending to abdominal margin; cell-spot smaller.

♀ not known.

Genitalia: Harpe somewhat shorter than in the preceding, dorsally angulate at apical fourth.

Hab. Colombia: Magdalena and Cauca valleys.

In the Tring Museum 7 ♂♂ from "Bogota."

111. *Papilio xanthopleura* Godm. & Salv. (1868).

Papilio xanthopleura Godman & Salvin, *Ann. Mag. N. H.* (4). ii. p. 150. n. 25 (1868) (R. Huallaga); Hew., *Exot. Butt.* iv. *Pap.* t. 10. fig. 32. ♂ (1869); Kirby, *Cat. Diurn. Lep.* p. 538. n. 140 (1871); Druce, *Proc. Zool. Soc. Lond.* p. 246. n. 19 (1876) (Lower Huallaga); Hopff., *Stett. Ent. Zeit.* xl. p. 53. n. 25 (1879) (Peru); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 238. sub n. 74

(1890) (smooth costa); Hahnel, *Iris* iii. p. 297 (1890) (Iquitos); Staud., *ibid.* iv. p. 63 (1891) (Iquitos); S. Thomar, R. Negro; S. Paulo de Oliv.; ♂, ♀; Haase, *Untersuch. Mimicry* i. p. 94 (1893).

♀. *Papilio xanthopleura* Salv. & Godm. var. *diaphora* Staudinger, *l.c.* (1891) (Manicoré; also Sao Paulo de Olivença acc. to Michael).

♂ ♀. Thorax with short yellow mesial stripe, corresponding to the mesial stripe of *P. zagreus* and allies. Abdomen with broad creamy yellow lateral stripe. Costal edge of forewing practically non-serrate. Disc of hindwing *above* with greyish green or greyish blue patches. No discal band on *underside* of hindwing; a creamy spot near anal angle being all that is left of the band; red submarginal spots large. The female is dimorphic:

a. ♀-f. *xanthopleura* is similar to the male, the bluish area of the hindwing being larger.

b. ♀-f. *diaphora* Stand., *l.c.*, bears a large creamy yellow central area on the forewing occupying the greater part of the cell and the disc between the median and lower radial veins, the bluish scaling of the hindwing being reduced to a narrow band.

Neuration: SC^2 of hindwing at one-third from base to R^1 .

Genitalia: ♂. Tenth tergite long, strongly narrowing distad, rounded-dilated at the apex; sternite on each side with two processes, the anterior one triangular, multidentate, the posterior one rather longer, narrower, slightly acuminate, concave on proximal surface; harpe broad, gradually narrowed from middle to base, dorsal edge of apical half somewhat elevate, densely denticulate, apex rotundate, longitudinally grooved, bearing a great number of small conical teeth at and near the edge; no process.—♀ not examined.

Early stages not known.

Hab. Upper Amazons and eastern slopes of Pern; may be expected to occur in Eastern Ecuador and Eastern Bolivia.

In the Tring Museum 2 ♂♂ from Iquitos (Stuart).

XII. Homerus Group.

Costal margin of forewing dentate, the teeth especially prominent in male. Abdomen without spots, entirely black, or the underside tawny-olive. Frons much wider than the eye is high (frontal aspect). Antenna short; club rather strong. Upper cross-vein of hindwing (D^2) longer than the second (D^3).

A. Hindwing, on underside, with a band of spots across disc, the spots rounded on distal side, at least the central ones:

a. Males *b.*
Females *d.*

b. Discal patch R^3-M^1 of forewing about three times as long as broad, extended to cell; cell-patch very large, at least on underside Species Nos. 115 and 116.

Discal patch R^3-M^1 widely separated from cell *c.*

c. Discal band on underside of hindwing consisting of separate red spots Species No. 112.

This band continuous, more or less creamy white, at least along its proximal edge Species Nos. 113 and 114.

- d.* Discal spots of underside of hindwing small, red, edged with black, last one entirely red or only a small portion of it creamy white Species No. 112.
 Last discal spot of underside of hindwing for the greater part creamy white *e.*
- e.* Underside of forewing with a large shadowy patch in cell near its middle Species No. 115.
 Cell-patch, if present, situated close to apex of cell Species No. 114.
- B.** Hindwing below with continuous pale band (sometimes washed over with brown) which is dentate upon the veins, being sinuate between the veins. Hindwing above with broad pale yellow continuous band across middle, or the posterior submarginal spots of the forewing beneath orange, or there is a discal row of orange-red lunules, or a dentate orange-red band on hindwing *e.*
 Hindwing without such a band on upperside; no orange spots Species No. 119.
- e.* Last one or two submarginal spots on underside of forewing orange Species No. 120.
 No orange spots on forewing; submarginal spots of underside of hindwing orange or red *f.*
- f.* Pale band of underside of hindwing washed over with brown Species No. 118.
 This band very sharply defined, strongly dentate on distal side Species No. 117.
- C.** Hindwing rounded, without band; forewing with large orange-red patches Species No. 121.

112. *Papilio victorinus* Doubl. (1844).

Papilio victorinus Doubleday, *Am. Mag. N. H.* xiv. p. 418 (1844) (♀, west coast of Amer.); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 35. n. 69. t. 6. fig. 3. ♀ (1852).

♂. *Upperside*.—Forewing: a row of creamy buff submarginal spots, and a discal row of similar spots, this row curving costad, the upper spots usually absent or vestigial, sometimes the whole row absent; some specimens with an additional row of indistinct olivaceous buff blotches anteriorly between the discal and submarginal series; costal margin serrate.—Hindwing: a discal row of more or less rounded or ovate spots, widely separated from one another, and a row of submarginal crescents, all creamy buff, in between the two rows a series of olivaceous buff blotches, which are absent from the Costa Rica form (of which only one specimen is known!); no tail, tooth R^3 usually a little more prominent than the others.

Underside.—Forewing: discal row of spots complete; anterior submarginal spots vestigial, brown.—Hindwing: a discal row of red rounded spots, all nearly the same size, the last one creamy posteriorly; submarginal halfmoons red; some specimens with buffish blotches at the outer side of the discal spots.

♀. Dimorphic, at least in certain districts, perhaps everywhere. One form resembling the male, bearing larger postdiscal olivaceous buff blotches on the upperside of the hindwing, the second form bearing instead of these blotches and

the discal spots a broad olive band, which narrows anteriorly; submarginal spots sometimes orange on upperside.

Neuration: lower angle of cell of forewing obtuse; SC^2 of hindwing midway between base and R^1 , or more proximal.

Genitalia: ♂. Tenth tergite long, spatulate, rather narrow before apex; sternite laterally with a transversely divided ridge, the proximal portion acuminate, the distal portion shorter, rounded, its anal edge irregular; beneath this second lobe, on the anal side, a small but distinct tooth; harpe long, slender, of almost even width from base to near apex, dentate distally, ending in a long tapering process which is curved upwards.—♀. In front of the vaginal orifice an acuminate or sinuate flap; lateral edges of orifice converging posteriorly, forming behind the orifice a channelled mesial ridge at each side of which there is a deep impression; laterally of this groove and somewhat more frontad there is a long, sharply pointed, curved, twisted process, which stands on the inner side of a long and strongly chitinised plate, the free edge of which is continuous with the anterior surface of the vaginal flap; this process often dentate on the posterior side.

Early stages described by Schaus (see literature below, under *P. v. victorinus*).

Hab. Mexico to Costa Rica.

Three subspecies.

a. P. victorinus morelius subsp. nov.

♂♀. Only one form of female known. *Upperside*: distal spots of forewing absent or small, those of hindwing also smaller than in the next form.

Underside: no spot in cell of forewing; submarginal spots of hindwing larger and more strongly arched than in the next.

Genitalia: ♂. Apical process of harpe longer and more strongly curved than in the next subspecies; teeth less numerous but larger, one or more long teeth on dorsal side.

Hab. West Mexico: Guerrero; Oaxaca.

In the Tring Museum 16 ♂♂, 5 ♀♀, from: Guerrero (O. T. Baron), type; Los Cojones, 17. August 1904, and Balsas R., near Iguala, Guerrero, 26. August 1904 (Dr. Gadow).

In the Hope collection at Oxford from Oaxaca.

b. P. victorinus victorinus Doubl. (1844).

Papilio victorinus Doubleday, *l.c.*; id., *List Lep. Ins. Brit. Mus.* i. p. 18 (1845); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 147 (1846); Gray, *l.c.*; id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 47. n. 177 (1856) (West Coast of America); Vollenh., *Tijdschr. Ent.* iii. p. 87. n. 144 (1860) (Vera Cruz); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 313. n. 337 (1864); Kirby, *Cat. Diurn. Lep.* p. 537. n. 131 (1871); Oberth., *Et. d'Ent.* iv. p. 73. n. 221 (1880) ("Ecuador" error loci); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 235, n. 71 (1890) (Vera Cruz, Oaxaca, Guatemala; Honduras; Nicaragua; = *amphissus* = *helleri*); Haase, *Untersuch. Mimicry* i. p. 94 (1893).

♀. *Papilio helleri* Felder, *l.c.* n. 336 (1864) (Mexico; *nom. indescr.*); id., *Reise Novara, Lep.* p. 91. n. 70. t. 13. fig. c. d. ♀ (1865) (Mexico); Schaus, *Papilio* iv. p. 101 (1884) (descr. of larva and pupa).

♀. *Papilio amphissus* Hopffer, *Stett. Ent. Zeit.* xxvii. p. 27. n. 8 (1866) (Mexico); Kirby, *l.c.* p. 567. n. 329 (1871).

Papilio victorinus var. *a. P. helleri*, Kirby, *l.c.*

♂. *Upperside*: discal row of spots on forewing represented at least by three spots; most specimens with a row of postdiscal olivaceous buff or bluish blotches.

—Hindwing: discal spots larger than submarginal ones, outside them a row of olivaceous buff spots, which are sometimes very small.

On *underside* a spot of variable size in cell of forewing.

♀. Dichromatic. One form resembling the male, but the postdiscal spots usually larger, sometimes confluent with the discal ones (♀-f. *victorinus*). In the type-specimen the olivaceous or bluish blotches are very small (they are not indicated in Gray's figure of the type). In the second form (♀-f. *amphissus*) the markings of the *upperside* are bluish or greenish, and the discal and postdiscal spots of the hindwing are replaced by a broad band.

Genitalia: ♂. Harpe more densely dentate distally than in the preceding, the teeth being also smaller.

Hab. Eastern Mexico to Nicaragua.

In the Tring Museum 18 ♂♂, 8 ♀♀, from: Cuesta de Misantla, June 1896. Jalapa, July 1897, Espinal, June 1896, Orizaba, March 1896, Vera Cruz (W. Schaus); Cordoba, 2800 ft., July 1904 (A. Hall); S. Pedro Sula, Honduras.

c. P. victorinus vulneratus Butl. (1872).

Papilio vulneratus Butler, *Cist. Ent.* i. p. 85 (1872) (Costa Rica); Kirby, *Cat. Diurn. Lep.* p. 814. n. 394 (1877); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 236. n. 72 (1890) (Costa Rica).

Pyrhrosticta vulnerata Butler, *Lep. Erot.* p. 165. t. 58. fig. 3. ♂ (1874); id. & Druce, *Proc. Zool. Soc. Lond.* p. 366. n. 385 (1874) (Costa Rica).

♂. Only one imperfect specimen known. Discal spots of both wings, on *upperside*, larger, and the submarginal ones smaller, than in the preceding forms; no bluish postdiscal blotches on upperside of hindwing.

Hab. Costa Rica.

One specimen (type) in coll. F. D. Godman.

113. *Papilio cephalus* Godm. & Salv. (1890).

Papilio cephalus Godman & Salvin, *Biol. Centr. Amer., Lep. Rhop.* ii. p. 235. n. 70. t. 71. fig. 4. 5. ♂ (1890) (Chiriqui, in coll. Standinger).

♂. One specimen only is known. Perhaps an aberration of *P. cleotas archytas*, which we think could easily be proved or disproved by an examination of the innerside of the clasper.

The row of discal spots on the *upperside* of the forewing extends to SM², spots R³—SM² not reaching to cell; submarginal row of spots evenly curved. *Underside* of hindwing with a row of blue crescents distally of the discal band; tail long. Head and pronotum are said to be without dots.

Hab. Chiriqui.

One specimen in coll. Standinger. We have not examined the insect.

114. *Papilio cleotas* Gray (1832).

Papilio cleotas Gray, in Griffith, *Anim. Kingdom* xv. p. 673. t. 86. ♂ (1832) (Brazil).

The evidence that this and the next species (*P. aristeus*) are both represented in some districts rests on the record of two single specimens belonging to *P. aristeus bitias*. Messrs. Godman & Salvin (1890) mention under the name of *bitias* a specimen of *P. aristeus* from Chiriqui (Standinger, collected by Trötsch). The second specimen is recorded by Felder from Bogota, and described as *P. ctesias*. This latter specimen has the body much compressed, looking as if it had been carried in a pocket-book. It may have been brought to Bogota from the eastern

side of Ecuador. If Standinger's Chiriqui example is not authentic, the various forms of *P. cleotas* and of *P. aristeus* represent each other geographically and should accordingly all be regarded as forms of one species. This would be a rational systematic treatment of the insects, considering that the distinguishing characters are individually variable, that some forms differ constantly and others do not, that some differ only in pattern or colour, others in structure, and others again in structure and pattern. The geographical distribution of the forms of *P. cleotas* (Costa Rica, Panama, Colombia, Venezuela, and S.E. Brazil), and of *P. aristeus* (Ecuador to Bolivia, Upper Amazons, Guiana, S.E. Brazil; and "Bogota," "Chiriqui," as mentioned above), renders it highly probable that we have here to do with one species only, the occurrence of *P. aristeus bitias* in "Chiriqui and Bogota," being accidental or the records being erroneous. This conclusion is corroborated by the fact that the Brazilian form of *P. cleotas* agrees in structure better with the Andesian forms of *P. aristeus* than with the northern forms of *P. cleotas*. However, as we may hope to get soon further evidence of the actual distribution of these insects, we deem it sufficient for the present to have drawn attention to *P. cleotas* and *P. aristeus* being only doubtfully distinct from one another.

♂. Costal margin of forewing serrate; a submarginal row of spots nearly parallel to distal margin, curving costad in front; a discal row of large spots from lower angle of cell to hindmargin, oblique or curved, approaching the submarginal row posteriorly; the two rows very strongly diverging anteriorly, there being usually a row of olivaceous buff or greyish blue blotches between them; cell-patch large, small, or absent; often some spots distally of cross-veins.—Hindwing: tail acute or absent; a creamy discal band of variable width; a submarginal row of spots.

Underside always with a patch in cell of forewing; hindwing always with a discal band of spots, these spots red, proximally more or less creamy, sometimes more extended creamy than red, last spot always creamy yellow, often also the first.

♀. Dimorphic; one form resembling the male, the other having the markings of the *upperside* more or less bluish or olive-buff.

Genitalia: ♂. Tenth tergite long, spatulate; sternite geographically and individually variable, the usual double ridge on each side, the first projection being usually pointed and often dentate, the second tooth more obtuse, bearing often on anal side a tooth; at apex of sternite mesially several teeth one behind the other, or one tooth, or a tooth right and left, or no teeth. Harpe long, of nearly even width, slightly curved, apical portion geographically and individually variable, mostly produced into a fork, fishtail-shaped, often the dorsal prong reduced and the ventral one curved upwards, sometimes three processes, in most forms a number of teeth in between the prongs and proximally of them.—♀. Similar to the armature of *P. victorinus*; lateral process dentate; proximal flap variable, dentate or simple, long or short.

Early stages not known.

Hab. Costa Rica; Panama; Colombia; North Venezuela; South-East Brazil.

a. P. cleotas archytas Hopff. (1866).

Papilio archytas Hopffer, *Stett. Ent. Zeit.* xxvii. p. 28. n. 9 (1866) (♂, Central America); Kirby, *Cat. Diurn. Lep.* p. 567. n. 330 (1871) (Amer. centr.).

Papilio laetitia Butler, *Cist. Ent.* i. p. 84 (1872) (Costa Rica); Kirby, *Cat. Diurn. Lep.* p. 813. n. 370 (1877); Staud., *Exot. Tafel.* p. 15. t. 10. ♂ (1884) (Costa Rica; Chiriqui, 2000–2500 m, ♀ similar to ♂).

Pyrrhosticta laetitia Butler, *Lep. Exot.* p. 161. t. 58. fig. 4 (1874); id. & Druce, *Proc. Zool. Soc. Lond.* p. 366. n. 384 (1874) (Costa Rica).

Papilio phaeton var. *laetitia*, Oberthür, *Et. d'Ent.* iv. p. 73. sub n. 220 (1880) (Chiriqui).

Papilio phaeton, Godman & Salvin, *Biol. Centr. Amer., Lep. Rhop.* ii. p. 234. n. 69. t. 71. fig. 6. genit. (1890) (variab. of ♀; Costa Rica; Panama; 4000—5000 ft. —“Colombia” alia subsp.).

♂. The middle discal spots and the cell-patch of the forewing on the whole larger and the submarginal spots smaller than in the Colombian form; hindwing obtusely dentate. The cell-patch is very variable, being sometimes almost square and sometimes nearly obsolete; the discal spots also vary much in size. The upper submarginal dots of the forewing are usually smaller than the posterior ones, the first one being occasionally absent; the spots around apex of cell mentioned in Hopffer's description are seldom all present.

♀. The two forms are each individually very variable, some specimens standing intermediate between the two forms:

a¹. ♀-f. *archytas* similar to the male, spots of forewing on the whole smaller, if sharply defined, or large and ill-defined.

b¹. ♀-f. *panthias* nov., markings of *upperside* more or less greenish or bluish (type of name from Chiriqui).

Genitalia: ♂. Harpe with three apical prongs, there being besides the usual two prongs one on the surface proximally of the ventral one of the usual pair; this additional prong is a prolonged tooth, there being mostly several other but smaller teeth between the prongs.—♀. Vaginal flap acuminate, dentate, long; lateral processes with several prominent teeth.

Hab. Costa Rica; Panama; Brava I.

In the Tring Museum 12 ♂♂, 5 ♀♀, from: Carillo, Costa Rica, 3000 ft., October 1904 (A. Hall); Guatil Piris, Costa Rica, December 1901 (Underwood); Chiriqui (Gounelle); Volcano de Chiriqui, 5000—9000 ft. (Watson); Boquete, 3500 ft. (Watson); Brava I., January 1902 (Batty).

b. *P. cleotas phaeton* Lucas (1857).

Papilio phaeton Lucas, in Casteln., *Voy. Amér. Sud, Léop.* p. 197. t. 2. fig. 1. ♂ (1857) (“Brézil intérieur” false); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 312. n. 332 (1864) (*partim*; Bogota); Kirby, *Cat. Diurn. Lep.* p. 537. n. 136 (1871) (Amer. mer.); Oberth., *Et. d'Ent.* iv. p. 73. n. 220 (1880) (var. excl.; N. Granada, type); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 234. n. 69 (1890) (*partim*; Colombia); Maass. & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 17. n. 15 (1890) (east side of Bogota Cordillera, 1300—1500 m.).

Papilio phaeton, Doubleday, *List Lep. Ins. Brit. Mus.* i. p. 18 (1845) (Colombia; nom. nudum); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 149 (1846) (nom. nud.); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 35. n. 170 (1852) (nom. nud.); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 47. n. 178 (1856) (nom. nud.); Hopff., *Stett. Ent. Zeit.* xl. p. 54. n. 28 (1879) (*partim*); Staud., *Exot. Tagf.* p. 15 (1884).

Papilio clearchus Felder, *l.c.* p. 313. n. 332 (1864) (nom. indescr.; Bogota); id., *Reise Novara, Lep.* p. 88. n. 67 (1865) (Bogota); Kirby, *Cat. Diurn. Lep.* p. 537. n. 134 (1871) (Bogota).

♂. Size of cell-patch and of discal spots on upperside of forewing very variable, the cell-patch sometimes absent, usually more oblique than in the preceding subspecies; upper submarginal spots larger than the posterior ones.—Width of band of hindwing likewise variable, the spots composing it sometimes separated from one another; tail longer than in *P. c. archytas*.

On *underside* the posterior submarginal spots of forewing usually close to the discal ones, often joined to them.

Felder's name *clearchus* is based on specimens without cell-patch on upperside of forewing, with small discal spots, and with the band of the hindwing, above, cut

up into spots. Such specimens are hardly distinguishable from the next form, except by the genitalia.

♀. Only that form of this sex is known to us which is similar to the male.

Genitalia: ♂. Tenth sternite usually with a small mesial tooth at apex as in *P. aristeus*; harpe ending in a hook which is strongly curved internad, the dorsal prong of the fork reduced to a short dentate projection which is more proximal than the dorsal prong in *P. c. archytas*, the oblique edge between the dentate projection and the apical hook more or less dentate.—♀ not dissected.

Hab. Colombia: Magdalena and Cauca valleys, and Cordillera of Bogota.

No representative is known from the West Coast of Colombia.

In the Tring Museum 90 ♂♂, 1 ♀, from: "Bogota"; Muza, November 1896; Pereira, Cauca; Cauca (Child); Gnadalite, Cundinamarca July 1903 (M. de Mathan).

c. P. cleotas coroebus Feld. (1860).

♂ *Papilio cleotas*, Kollar (*non* Gray, 1832, *err. det.*), *Sitz. Ber. K. Ak. Wiss. Wien, Math. Nat. Cl.* i. p. 355. n. 12 (1850) (Angostura, Venezuela;—locality correct?).

♀. *Papilio coroebus* Felder, *Wien. Ent. Mon.* v. p. 75. n. 11 (1860) (Mérida, coll. Kadeu); *id.*, *Verh. Zool. Bot. Ges. Wien* xiv. p. 312. n. 326 (1864); *id.*, *Reise Novara, Lep.* p. 84. n. 64. t. 13. fig. a. b. (1865) (Mérida); *Staud.*, *Exot. Tagf.* p. 15 (1884).

♂. *Papilio phitocleon* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 313. n. 333 (1864) (*nom. nud.*; Colombia); *id.*, *Reise Novara, Lep.* p. 89. n. 68 (1865) (*hab. ?*); Kirby, *Cat. Diurn. Lep.* p. 537. n. 135 (1871) (Colombia).

♀ *Papilio corebus* (!), Hewitson, *Exot. Bull.* iv. *Pap.* x. text sub *xanthopleura* (1869).

♀ *Papilio birchalli* var. a. *P. coroebus*, Kirby, *Lc.* p. 538. sub n. 139 (1871) (Venezuela—"Yucatan" error loci).

♂. *Papilio phaeton*, Hopffer, *Stett. Ent. Zeit.* xl. p. 54. n. 28 (1879) (*partim*).

♂ *Papilio lycortas* Felder, *l.c.* (*partim*; R. Negro); *Staud.*, *l.c.* p. 15. t. 10. ♂ (1884) (Venezuela); Habel, *Iris* iii. p. 194 (1890) (Mérida); Eimer, *Orthogen.* p. 221. fig. 169 (1897) (*diagr. copy of Staud.'s fig.*; *neur. of hindw. erroneus*).

♂. *Papilio cleotas* var. *lycortas*, Oberthür, *Et. d'Ent.* iv. p. 73. sub n. 219 (1880) (Mérida).

In pattern not sharply separated from the preceding form.

♂. Discal spot R³—M¹ of *upperside* of forewing more proximal than in *P. c. phaeton*, the last two spots of this row comparatively larger, the submarginal spots on the whole smaller, cell-patch vestigial or absent, never so sharply marked as it is in many *phaeton*.—Hindwing: third and fourth spots of discal band smaller than in *phaeton*, all the spots separated, the third occasionally obsolescent; submarginal spots small in most individuals.

♀. Dichromatic.

a. ♀-f. *dione* nov.; similar to the male, usually with buffish blue scaling proximally of discal band of upperside of hindwing.

b. ♀-f. *coroebus* Felder, *l.c.*; markings of *upperside* nearly olive-buff or bluish, the spots of forewing reduced or ill-defined; discal band of hindwing, *above*, widening behind; discal band of *underside* of hindwing narrower than in ♀-f. *dione*, more extended red.

Genitalia: ♂. Harpe similar to that of *phaeton*, broader before apex, the proximal dorsal prong rather longer, pointed, the teeth between this prong and the apical hook longer and more regular in position.—♀. Vaginal flap broad and long, dentate, lateral process armed with several long teeth.

Hab. Eastern side of the Cordillera of Bogota; Venezuela.

In the Tring Museum 33 ♂♂, 10 ♀♀, from: Peperital to Buenavista, East Colombia, 400—1200 m., January 1897, dry season, forest (Dr. Bürger); Mérida, Tachira and Mocotóné, Venezuela (Briceño).

d. P. cleotas cleotas Gray (1832).

- ♂. *Papilio cleotas* Gray, in Griffith, *Anim. Kingd.* xv. p. 673. t. 86 (1832) (Brazil); Boisd., *Spec. Gén. Lép.* i. p. 364. n. 207 (1836 (Brazil; Uruguay : ♂, ♀); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 18 (1845) (Brazil); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 50 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 35. n. 172 (1852) (*partim*); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 47. n. 180 (1856) (*partim*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 360. n. 184 (1864); Kirby, *Cat. Diurn. Lep.* p. 537. n. 133 (1871) (Brazil; Uruguay); Burm., *Descr. Rép. Argent.* v. *Lép.* p. 61. n. 3 (1878) (*partim*;—descriptio ad spec. *P. hellanicus* dictam referend.); Oberth., *Et. d'Ent.* iv. p. 73. n. 219 (1880) (Uruguay); Haase, *Untersuch. Mimicry* i. p. 94 (1893); Weym., *Stett. Ent. Zeit.* lv. p. 315. n. 10 (1895) (Rio Grande do Sul); Bönningh., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 28 (1896) (Petropolis).
- Papilio lycortas* Felder, *Wien. Ent. Mon.* v. p. 75. n. 10 (1860) ("Caracas" error loci); id., *Verh. Zool. Bot. Ges. Wien* xiv. p. 313. n. 335 (1864) (*partim*; "Caracas"); id., *Reise Novara, Lep.* p. 90. n. 69 (1865) (*partim*; "Caracas"); Kirby, *Cat. Diurn. Lep.* p. 537. n. 132 (1871).
- Papilio oleotas* (1), Felder, *l.c.* p. 313. n. 334 (1864) (Bras. austr.; Uruguay).
- Papilio phaëton*, Hopffer (*non* Lucas, 1857, err. det.), *Stett. Ent. Zeit.* xl. p. 54. n. 28 (1879) (*partim*).
- Papilio cleothas* (1), Mabilde, *Guia Pract. Borbol. Rio Grande do Sul* p. 46 (1896).
- Papilio cleotas* var. od. n. sp. ?, Bönningh., *l.c.* ("markings green"—doubtless ♀).

Felder's *lycortas*, which is based on specimens supposed to be from Caracas (Kaden), is the same as *cleotas*; Kaden's specimens were doubtless Brazilian.

♂. Discal band of forewing, *upperside*, more oblique than in the other subspecies, spot M²—SM² small or vestigial; cell-patch small or absent; a row of large olivaceous buff blotches from costal margin backwards between the discal and submarginal rows of spots.—Band of hindwing always broken up into spots; the last four or five submarginal spots red in most specimens.

♀. Dichromatic.

a'. ♀-f. *cleotas* similar to the male, easily distinguished from *P. cleotas coroebus* ♀-f. *dione* by the row of olivaceous buff blotches on the forewing and the smallness of the discal patch M²—SM².

b'. ♀-f. *adaca* nov.—Name-type from Blumenau. An oblique discal row of bluish blotches on upperside of forewing, the row gradually disappearing in front, usually not extending forward beyond lower angle of cell; postdiscal row of similar blotches from costal margin backwards; sometimes the posterior postdiscal spots merged together with the discal ones; a submarginal row of spots as in male, the upper ones being more or less bluish.—Hindwing: a discal and a postdiscal band of spots buffish blue, the discal band broader than the postdiscal one, the first and the last discal spot often partly creamy; submarginal spots buffish blue, anterior ones more or less creamy, last one usually red.—Discal band of *underside* of hindwing more extended red than in ♀-f. *cleotas*; last spot creamy on abdominal side.

Genitalia: ♂. Tenth sternite with or without anal mesial tooth; harpe similar to that of *P. aristeus bitias*, with two straight prongs at apex of nearly the same length, both directed anad, there being often a very few teeth between the prongs, some specimens bearing some minute teeth on the hinder side.—♀. Lobe in front of vaginal orifice short, simple or dentate, lateral process slender, very sharply pointed, bearing a tooth on the posterior side.

Hab. Brazil; Uruguay (teste Boisduval).

In the Tring Museum 9 ♂♂, 6 ♀♀, from: Petropolis, March 1898 (J. Foetterle); Espiritu Santo; Theresopolis, S. Catharina, November 1894—February 1895 (J. Michaelis); Blumenau.

115. *Papilio aristeus* Cram. (1781).

♀. *Papilio aristeus* Cramer, *Pap. Erot.* iv. p. 139. t. 361. fig. A. B (1781) (Surinam).

Since the *P. aristeus* of Cramer's plate 318 belongs to the Kite-Swallowtails, and therefore will stand in another genus when the Swallowtails are generically revised, there is no objection against retaining the name *aristeus* also for the present insect. There is no reference to this species in the Index of Cramer's volume.

We have explained above, under *P. cleotas*, our reasons for regarding *P. aristeus* as being doubtfully distinct as a species from *P. cleotas*.

♂. Cell-patch of forewing very large; discal patches R^3-M^2 very long, contiguous with the cell-patch, sometimes patch M^1-M^2 obsolescent.—Hindwing with or without broad creamy discal band.

♀. Dichromatic. One form resembling the male. In the second form the markings of upperside bluish, submarginal dots the same colour or partly creamy; forewing with band of ill-defined patches on disc; hindwing with broad discal band, widening behind, entering cell.

Cell-patch of forewing below more or less distinct, large.

Genitalia similar to those of *P. cleotas*; tenth sternite of male always with mesial apical tooth or several teeth standing one behind the other; harpe with two apical processes and some teeth.—♀. Nearly the same as in *P. cleotas cleotas*; lobe in front of vaginal orifice short, broad, dentate, carinate on hinder surface.

Early stages not known.

Hab. Dutch and French Guiana; Upper Amazons; Ecuador to Bolivia; Sao Paulo (S.E. Brazil); Bogota and Chiriqui.

We doubt the correctness of the record from the last two localities.

a. *P. aristeus aristeus* Cram. (1781).

♀. *Papilio aristeus* Cramer, *l.c.* (Surinam).

♀. *Caluides menatius* Hübner, *Verz. bek. Schmett.* p. 86. n. 894 (1818 ?) (nom. nov. loco *aristeus*).

♀. *Papilio bitias* a. *Papilio aristeus*, Godart, *Enc. Méth.* ix. p. 39. sub n. 43 (1819).

♀. *Papilio coristheus* Boisduval, *Spec. Gén. Léop.* i. p. 323. n. 166 (1836) (nom. nov. loco *aristeus*); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 20. n. 246 (1847); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 67 n. 298 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 77. n. 315 (1856); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 312. n. 325 (1864).

♀. *Papilio aristaeus* (!), Boisduval, *l.c.* (sub syn.).

♀. *Papilio menatius*, Kirby, *Cat. Diurn. Lep.* p. 538. n. 141 (1871) (Surinam); Haase, *Untersuch. Mimicry* i. p. 94 (1893).

♂. *Papilio ctesias* var. (*geographica*? Au species distincta?), *bari* Oberthür, *Et. d'Ent.* iv. p. 72. sub n. 217. t. 5. fig. 3 (1880) (Guyane française).

♂. *Upperside*.—Forewing: cell-patch rhombiform; discal spot R^2-R^3 long, patch R^3-M^1 nearly reaching submarginal spots, ill-defined distally, patch M^1-M^2 represented by a narrow shadowy streak situated along M^1 .—Hindwing: discal band represented by two creamy patches M^1-SM^2 and vestiges of the other spots.

Discal patch M^1-M^2 of *underside* of forewing much larger than above, extending to M^2 .

♀. The figure of Cramer appears to be all that is known of this sex. A row of long, ill-defined, greyish blue streaks on disc of forewing from costal to inner margin; blue band of hindwing very broad.

Hab. French and Dutch Guiana.

One ♂ in coll. Oberthür. We have not seen this insect in other collections.

b. P. aristeus etesiades subsp. nov.

- ♂. *Papilio ctesias* Hahnel (*non* Felder, 1865, err. det.), *Iris* iii. p. 297 (1890) (Iquitos).
 ♂. *Papilio ctesias* var., Staudinger, *Iris* iv. p. 64 (1891) (Upper Amazons).

This form has been distributed by Messrs. Staudinger and Bang-Haas under the name *etesiaides*, which we retain.

The name has apparently not been published by the late Dr. Staudinger.

♂. Cell-patch of forewing, *upper side*, placed along median vein, nearly reaching to base, touching SC near base; discal patches R³—M² large, there being also a spot behind M² occupying the angle formed by this vein and M. — No discal band on hindwing, but occasionally traces of the last two spots of this band.

Discal spots of *underside* of hindwing red, small, the first one or two and the last one or two creamy white.

♀ not known.

Hab. Upper Amazons.

In the Tring Museum 2 ♂♂ from Iquitos.

In coll. Oberthür from : Iquitos ; Cavallo Cocho, Peru, May—July (Mathan).

c. P. aristeus dysmias subsp. nov.

- Papilio bitias*, Godman & Salv. (*non* Godart, 1819, err. det.), *Biol. Centr. Amer., Lep. Rhop.* ii. p. 237. sub n. 73 (1890) (S.E. Brazil).

♂. Similar to *P. a. ctesiaides*. — *Upper side*, forewing : cell-patch smaller, being narrower, not extending to the base; a small spot at apex of cell and a dot beyond cross-vein D³; two large patches R³—M² on disc, the first not quite reaching R³, the second distally somewhat narrowed, joining the subcostal spot, a small patch behind base of M², as in *etesiaides*, but smaller; submarginal spots SC³—R³ elongate. — Hindwing as in *bitias*, the discal band being represented by a single spot C—SC² and some bluish dispersed scales posteriorly on disc; submarginal spots much larger than in *etesiaides*.

Underside : cell of forewing with a large blotch at upper angle; discal patches as above, the first being rather wider, patch behind base of M² vestigial; three distinct submarginal spots. — Hindwing as in *bitias*.

Hab. Province Sao Paulo (Rogers), probably from the interior; may be expected to occur in Goyaz and Matto Grosso.

1 ♂ in coll. F. D. Godman.

Connects *etesiaides* with *bitias*.

d. P. aristeus bitias Godt. (1819).

- ♂. *Papilio bitias* Godart, *Enc. Méth.* ix. p. 39. n. 43 (1819) (South America.—quot. Cram. exel.); Boisdu., *Spec. Gén. Lép.* i. p. 323. n. 165 (1836); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 20. n. 245 (1847); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 67. n. 297 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 76. n. 314 (1856) (South America); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 312. n. 329 (1864) (hab. ?); Kirby, *Cat. Diurn. Lep.* p. 537. n. 138 (1871); Staud., *Erot. Tagf.* p. 15. t. 10. ♂ (1884) (Chanchamayo); Maass. & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 77. n. 32 (1890) (Rio Mayo, N. Peru); Haase, *Untersuch. Mimicry* i. p. 94 (1893) ("New Granada"); Haensch, *Berl. Ent. Zeitschr.* xlviii. p. 153 (1903) (Sa. Inez, R. Pastaza, 1250 m.).
 ♂. *Papilio eucrotus* Felder, *Wien. Ent. Mon.* vi. p. 66. n. 2 (1862) (R. Negro); id., *Verh. Zool. Bot. Ges. Wien* xiv. p. 312. n. 328 (1864); id., *Reise Novara, Lep.* p. 85. n. 65 (1865) (Upper Rio Negro); Hopfl., *Stett. Ent. Zeit.* xl. p. 53. n. 26 (1879) (Chanchamayo; = ? *bitias*); Staud., *l.c.* p. 15 (1884); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 237. n. 73. t. 71. fig. 7. genit. (1890) (Chiriqui).

♂. *Papilio ctesias* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 312. n. 330 (1864) (nom. nnd.; New Granada); id., *Reise Novara, Lep.* p. 86. n. 66. t. 14. fig. c. d (1865) (Bogota); Druce, *Proc. Zool. Soc. Lond.* p. 246. n. 18 (1876) (Pozuzo, Cosnipata, Ucayali, Huasampilla); Oberth., *Et. d'Ent.* iv. p. 72. n. 217 (1880) (var. excl.; Ecuador).

Papilio bitias var. a. *P. eurotas*, Kirby, *Cat. Diurn. Lep.* p. 538. sub n. 138 (1871).

Papilio bitias var. b. *P. ctesias*, id., *l.c.*

Papilio lacordairei Borre (Belval ined.), *C. R. Soc. Ent. Belg.* xxviii. p. 126 (1884) (= *ctesias*).

Papilio bitias var. *ctesias*, Dognin, *Lép. Loja* p. 14 (1887).

The characters by which Felder distinguished *eurotas* and *ctesias* are purely individual. The body of the type-specimen of *ctesias* is much compressed; it may have been brought to Bogota from Eastern Ecuador in a pocket-book. The specimens named *eurotas* are said to be from the Upper Rio Negro, where no recent collections have been made. The species probably extends eastwards between the Amazons and Rio Meta.

♂. Cell-patch of forewing more transverse than in the preceding form, very variable in size like the discal spots.—Discal band of hindwing, above, obsolete or at least widely interrupted.

♀. Dimorphic.

a'. ♀-f. *bitias* resembling the male; a specimen from Sarayaçn in coll. F. D. Godman.

b'. ♀-f. *therapes* nov.—Bluish discal patches of forewing and discal area of hindwing less extended than in female of *P. a. aristeus*; cell-patch of forewing below partly creamy yellow.

Hab. Eastern Ecuador and Eastern Peru; Upper Rio Negro; "Bogota"; "Chiriqui"; the last two localities requiring confirmation.

In the Tring Museum 225 ♂♂, 1 ♀, from: "Bogota" and "Upper R. Negro" (coll. Felder); Zamora, Ecuador (O. T. Baron); Loja; R. Mixiollo, Loreto (Baer); Pozuzo, Huánuco (W. Hoffmanns); Chanchamayo (Schunke, Hoffmanns); Perené R., March 1900 (Simons); Huayabamba; La Merced (Watkins & Tomliason); R. Toro, La Merced, August—September 1901 (Simons); Caradoc, Marcapata, 4000 ft., February 1901 (Ockenden); Cajon, Cuzco, October 1900 (Garlepp); Oroya, R. Inambari, 3500 ft., November 1901 (Ockenden); La Union, R. Huacamayo, Carabaya, January 1901, 2000 ft., wet season (Ockenden).

A female from Ecuador in coll. Hewitson.

c. P. aristeus vilcanotus subsp. nov.

♂. We know only three specimens, two of which are in the collection of Mons. Charles Oberthür, who received them from Staudinger under the above name, which we accept, a third specimen from the same source being in coll. Adams.

They agree with the preceding form, but differ in the cell-patch of the forewing and the costal spots of the hindwing being ochraceous on the *upperside*, the discal patches of the forewing above being washed with buff proximally; cell-patch below clayish.

Hab. Vilcanota, South Peru.

f. P. aristeus coelebs subsp. nov. (Pl. V. fig. 14).

♂. *Papilio lenaeus*, Oberthür (*non* Doubleday, 1846, err. det.), *Et. d'Ent.* iv. p. 72. n. 218 (1880) (Tambillo, Peru).

♂. *Upperside*.—Forewing: cell-patch narrow, often a mere bar; discal patch R³—M¹ reduced distally and on costal side, patch M¹—M² narrow, triangular,

not reaching cell, widest distally; a row of large olivaceous buff blotches from R^3 to costal margin, a more or less distinct similar blotch in apex of cell; submarginal spots large, a spot at hinder margin close to angle.—Hindwing: band complete, entering cell or not, the veins traversing it less extended black than in *lenaeus*; a row of rather large olivaceous buff spots at outside of band; submarginal spots creamy yellow, large.

Underside paler than in *lenaeus* and *bitias*.—Forewing: cell-patch larger than above, but much smaller than in *bitias* and *lenaeus*; a blotch in upper angle of cell, as in most *bitias*; submarginal spots as in *bitias*, four or five clearly marked, the others vestigial.—Discal band of hindwing creamy white, each spot except the last bearing a rufous red spot distally, the veins narrowly black, the band not being broken up into separate spots.

♀ not known.

Hab. North-West and North-Central Peru.

In coll. Oberthür a small series from Tambillo and Chachapoyas.

In coll. Dognin from Loja (probably western side).

g. P. aristeus lenaeus Doubl. (1846).

♂. *Papilio lenaeus* Doubleday, in Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 148. t. 4. fig. 2. ♂ (1846) (Bolivia); id., *List Lep. Ins. Brit. Mus. i. Append.* p. 4 (1848); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 312. n. 331 (1864) (Bolivia); Kirby, *Cat. Diurn. Lep.* p. 537. n. 137 (1871); Hopff., *Stett. Ent. Zeit.* xl. p. 54. n. 27 (1879) (Bolivia); Haase, *Untersuch. Mimicry* i. p. 94 (1893); Weeks, *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumani).

Papilio cleotas, Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 35. n. 172 (1852) (*partim*; "*lenaeus* = ♀ of *cleotas*" false); id., *List Lep. Ins. Brit. Mus. i. Pap.* p. 47. n. 180 (1856) (*partim*).

Papilio phaëton, Hopffer, *l.c.* xl. p. 54. n. 28 (1879) (*partim*); Weeks, *l.c.* (1905) (Chulumani).

♂. Cell-patch of forewing on the whole less oblique than in *bitias*, discal spot R^2 — R^3 always present, patch M^1 — M^2 strongly narrowing proximally.—Band of hindwing complete or narrowly interrupted, often entering cell.

♀ not known.

Hab. Eastern Bolivia, and S.E. Peru.

In the Tring Museum 17 ♂♂ from: R. Songo to R. Suapi, 1100 m., March—June 1896 (Garlepp); Gnanay, Mapiri R., 1500 ft., March 1895 (Stuart); S. Augustin, Mapiri R., 3500 ft., and Mapiri, 1800 ft., September 1895 (Stuart); Reyes and Muehay, R. Beni, August 1895 (Stuart); R. Tanampaya (Garlepp); Province Sara, S. Cruz de la Sierra, February—April 1904 (J. Steinbach).

116. *Papilio judicaël* Oberth. (1888).

♂. *Papilio judicaël* Oberthür, *Et. d'Ent.* xii. p. 3. n. 6. t. 2. fig. 4 (1888) (Huambo, N. Peru).

♂. *Upperside*.—Forewing: a narrow patch across cell and a band of four discal spots from lower angle of cell to SM^2 dirty ochraceous; a row of small submarginal spots of the same colour.—Hindwing resembling in outline that of *P. warszewiczi*; tooth R^3 prolonged to a tail which is less acute than in *P. aristeus*, tooth M^1 also long, and tooth M^2 long, broad and obtuse; a row of vestigial ochraceous buff discal blotches, the first and the last spot being more distinct, an incomplete row of postdiscal blotches, and a submarginal row of small spots.

Underside.—Forewing: cell-patch and discal patches large, clayish ochraceous; submarginal spots small.—Hindwing: a discal band as in the allied species, dirty white, distally slightly washed with orange-red; submarginal spots rufous-red, the upper ones shaded with olive-buff.

♀ not known.

Genitalia as in *P. aristeus*, but tenth sternite anally in middle with two teeth side by side, not one behind the other. Harpe with two simple prongs as in *P. aristeus* and *P. cleotas cleotas*, the upper prong a little longer than the lower, not lying close on the clasper, the dorsal apical edge of the harpe being a little twisted away from the latter.

Hab. Huamba, Dept. Amazonas, North Peru; in coll. Oberthür.

Only one specimen is known. The insect stands intermediate between *P. aristeus* and *P. cleotas*, but has longer tails than these species. The band in the middle of the forewing being very narrow above and very broad below is an interesting character.

117. *Papilio garamas* Hübn. (1834?).

♀. *Euphœades garamas* Hübner, *Samml. Erot. Schmelt.* iii. t. 19 (1834?) (Mexico).

♂. *Heraclides asclepius* id., *l.c.* iii. t. 20 (1834?) (Mexico).

This purely Central American species consists of five subspecies, of which the differences in pattern, though not very striking, are almost constant in a series, being moreover accompanied by interesting differences in the genitalia.

♂. Costal edge of forewing serrate; a pale yellow band from costal margin proximally of apex of cell to distal third of hindmargin; a row of submarginal spots of the same colour, starting at distal fourth of costal margin, consisting of four or more spots, the fourth and following spots standing near the distal margin.—Hindwing strongly dentate, teeth M¹ and M² prolonged, tail long, asymmetrically spatulate; a continuous discal band as on forewing, of about even width, strongly and regularly dentate on distal side; a row of submarginal bars, sometimes absent; a row of blue postdiscal blotches, varying in number, often small or vestigial.

Underside like upper, bands paler, especially that of hindwing; submarginal row of spots of forewing usually continued to hinder angle.—Band of hindwing edged with orange-tawny distally; submarginal crescents longer than above, more or less orange or tawny-orange.

♀. Dichromatic, at least in Mexico. One form is devoid of the yellow discal band on both wings. The forewing bears a row of olivaceous buff postdiscal blotches and a row of small submarginal spots, there being on the hindwing a row of strongly arched discal crescents which are bright brick-red or orange-rufous, followed by a row of blue patches and a row of submarginal spots; on the *underside* of the forewing there is sometimes a trace of the discal band of the male.

The other form resembles the ♂. There are occasionally some small spots at the distal side of the cross-veins of the forewing, corresponding to the distal branch of the forked band of *P. homerus*.

Genitalia of the same type as in *P. aristeus*, *vietorinus*, etc. ♂. Tenth tergite long, strongly compressed beneath, prismatical, except at apex; sternite with a broad lateral lobe, which is divided by a groove and a sinus into a proximal and a distal projection, there being anally in the middle sometimes a distinct conical tooth as in *P. aristeus*. Harpe long, flat, similar to that of *P. aristeus* and *P. homerus*, geographically variable.—♀. Almost exactly as in *P. homerus*, the vaginal tubercle and the lateral process somewhat dentate, the posterior lateral ridge visible without dissection.

Early stages not known.

Hab. Mexico to Panama.

a. *P. garamas abderus* Hopff. (1856).

♂. *Papilio abderus* Hopffer, *Neue Schmett.* ii. p. 1. n. 1. t. 1. fig. 1. 2 (1856) (Mexico); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 313. n. 343 (1864); Kirby, *Cat. Diurn. Lep.* p. 537. n. 125 (1871).

♂ ♀. *Papilio asclepius*, Godman & Salvin (*non* Hübner, 1834?, *err. det.*), *Biol. Centr. Amer., Lep. Rhop.* ii. p. 238. n. 75. t. 72. fig. 3. genit. (1890) (*partim*; Jalapa; Orizaba).

Papilio electrion (!), Barrett (*non* Bates, 1864, *err. det.*), *Ent. News* xi. p. 428 (1900) (Orizaba, *descr.* of ♀, similar to ♂; distinct from *P. asclepius*).

♀. *Upperside*, forewing: four submarginal spots, fifth often vestigial. Hindwing: band always entering cell; no submarginal spots.

Underside: submarginal row of spots of forewing continued to SM², more or less distinctly angulate at R², usually some traces of spots on disc between the median band and the submarginal series. Hindwing: orange-red projections of median band shorter than in the preceding, of the same length on both sides of each vein.

♀. Dichromatic.

a'. ♀-f. *abderus*.—Similar to male. Forewing, above, occasionally with more postdiscal spots than four and with blotches of buffish scales on disc; band of hindwing not always entering cell, the distal projections more or less orange-red above, and the submarginal spots often vestigial, red on upperside.

b'. ♀-f. *amerias* nov.—*Upperside*, forewing: a row of obscure olivaceous buff blotches on disc; a submarginal row of spots from costal margin to SM², the spots small, not sharply defined. Hindwing: orange-red crescents very large (corresponding to the distal portion of the median band of male), strongly arched, except the first one, crescents R²—M² being the largest; submarginal spots large, pale tawny-orange, upper ones creamy proximally.—*Underside*: forewing with some creamy scaling in cell representing the cell-patch of male; blotches on disc as above, but larger; proximally of them some other blotches, which are a remnant of the median band; submarginal spots small. Hindwing: all the discal crescents strongly arched, paler than above, and the posterior ones not so broad; submarginal spots only slightly curved.

Genitalia: Harpe straight, apical processes also straight, lower one shorter than the upper.

Hab. Eastern Mexico: Vera Cruz.

In the Tring Museum 9 ♂♂, 5 ♀♀, from: Orizaba, February and March, Jalapa, July, Espinal and Cuesta de Misantla, June (W. Schaus); Jalapa, August; Monterey; Huatuxco.

b. *P. garamas garamas* Hübn. (1834?).

♀. *Euphœades garamas* Hübner, *l.c.*

♂. *Heracles asclepius* id., *l.c.*; Kirby, in Hübn., *Samml. Exot. Schmett.* cd. ii. p. 99. t. 458. fig. 1. 2, t. 460. fig. 1. 2 (190-?) (Mexico; *synon. partim*; *concinatus* (!) laps. typ.).

♂. *Papilio concinatus* Boisduval, *Spec. Gén. Léop.* i. p. 346. n. 186 (1836) (Mexico); Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vii. p. 50 (1838).

♂. *Papilio asclepius*, Doubleday, *List Lep. Ins. Brit. Mus.* i. p. 17 (1845) (*partim*); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 13. n. 84 (1846) (*partim*; Mexico); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 23. n. 105 (1852) (*partim*); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 31. n. 112 (1856) (*partim*; Mexico); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 146 (1863); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 313. n. 342 (1864) (*partim*; Mexico); Kirby, *Cat. Diurn. Lep.* p. 537. n. 125 (1871) (*partim*).

♀. *Papilio garamas*, Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 178 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 40. n. 201 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 55. n. 212 (1856); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 313. n. 344 (1864); Kirby, *Cat. Diurn. Lep.* p. 537. n. 124 (1871).

Papilio concinnatus (!), Gray, *l.c.* (sub syn.).

Papilio asclepius, Oberthür, *Et. d'Ent.* iv. p. 74. n. 225 (1880) (Cuernavaca); Godm. & Salvin., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 238. n. 75 (1890) (*partim*; Oaxaca); Haase, *Untersuch. Mimicry* i. p. 93 (1893); Barrett, *Ent. News* xi. p. 428 (1900) (Central and Western Mexico).

Papilio asclepius (!), id., *l.c.*

Messrs. Godman and Salvin were wrong in considering Hübner's figures as representing two females; the second figure is that of a male of the present subspecies. The Mexican material at the disposal of these authors was insufficient, which explains that the West and East Mexican forms were treated by them as being identical, while the forms from Guatemala and farther south are described as belonging to two separate species.

The West Mexican specimens are larger than East Mexican individuals, the dentition of the hindwing is stronger, the tail is more spatulate, and the pattern is different.

♂. *Upperside*.—Forewing: an evenly curved row of five or six submarginal spots, often a seventh or even an eighth spot indicated; no olivaceous buff blotches on disc; proximal edge of median band more even than in *P. g. abderus*.—Hindwing: median band not entering cell, or only just the extremity; submarginal spots distinct.

Underside: no blotches on disc of forewing.—Hindwing: distal orange projections of band shorter than in *abderus*, the anterior portion of each projection shorter than the portion behind the vein.

♀. Two forms.

a'. ♀-f. *amisa* nov.—Similar to male; forewing often with some small spots at upper angle of cell and distally of the cross-veins, the spots being larger below.

b'. ♀-f. *garamas* Hübn., *l.c.*—Resembling *abderus* ♀-f. *amerias*. Postdiscal olivaceous buff spots of forewing arched; crescents of hindwing much smaller than in ♀-f. *amerias*, their horns being much shorter; blue spots larger; submarginal spots thinner; no vestiges of median band, or only a very few buff scales in cell.

Genitalia: ♂. Proximal lobe of tenth sternite broad, denticulate, sometimes sinuate; mesially at apex of the sternite a tooth as in *P. aristeus*.

Hab. West Mexico: Guadalajara, Cuernavaca, Oaxaca.

In the Tring Museum 25 ♂♂, 7 ♀♀, from: Cuernavaca, 4000 ft., July 1904 (A. Hall); Cuernavaca, end of August 1904 (Dr. Gadow); Coantla, Morelos, June 1904, 3000 ft. (A. Hall); Salvatierra; Uruapan; Mexico City (coll. Felder).

c. *P. garamas baroni* subsp. nov.

♂. *Upperside*.—Forewing: a row of five submarginal spots, the fifth spot small, standing several mm. nearer the margin than the fourth.—Hindwing: median band entering cell, its proximal margin crossing cell halfway between R³ and M¹; blue spots small; submarginal spots vestigial.

Underside: apex of forewing and basal area of hindwing paler than in the previous forms.—Forewing: submarginal spots SC³-R² continuous, this narrow band followed from R² to SM² by a much thinner line which begins at R² distally of the bands.—Hindwing: projections of median band as short as in *P. g. garamas*, almost the same length at both sides of the veins; four upper submarginal spots

connected with one another, as is often the case in *P. g. abderus*; dentition prominent, tail long, spatulate.

♀ not known.

Genitalia: Tenth sternite as in *g. garamas*; harpe quite different, the upper prong being very much shorter than the lower.

Hab. Sierra Madre do Sul, Guerrero (O. T. Baron).

1 ♂ in the Tring Museum.

d. P. garamas electryon Bates (1864).

Papilio asclepius Doubleday (non Hübner, 1834 ?, err. det.), *List Lep. Ins. Brit. Mus.* i. p. 17 (1845) (syn. excl.; Honduras); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 13. n. 84 (1846) (*partim*; Honduras); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 23. n. 105 (1852) (syn. excl.; Honduras); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 31. n. 112 (1856) (*partim*; Honduras); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 313. n. 342 (1864) (*partim*; Honduras); Kirby, *Cat. Diurn. Lep.* p. 537. n. 126 (1871) (*partim*; Honduras); "*P. achelous*" alii species).

♂. *Papilio electryon* Bates, *Ent. Mo. Mag.* i. p. 3. n. 4 (1864) (Guatemala); Felder, *l.c.* p. 313. n. 341 (1864) (cit. falsa); Kirby, *l.c.* p. 537. n. 126a (1871); Godm. & Salv., *Biol. Centr. Amer., Lep. Rhop.* ii. p. 239. n. 76. t. 72. fig. 1. 2. ♂ (1890) (Guatemala).

♂. *Upperside*.—Forewing: cell-patch narrowing costally; four or five submarginal spots, the second smaller than the third, sometimes a sixth spot indicated; the first four larger than in Mexican males.—Hindwing: median band entering cell as in *P. g. abderus*; blue spots small, often vestigial; submarginal spots absent; tail spatulate; red anal marginal spot rarely present.

Underside: band of forewing strongly dentate on disc; submarginal line angulate at R²; no blotches on disc.—Projections of band of hindwing about as long as in *P. g. garamas*, nearly the same length on both sides of each vein; submarginal spots linear, red.

♀ not known.

Genitalia: Proximal lobe of tenth sternite narrower than in *P. g. garamas*, denticulate, mesial apical tooth present or vestigial; harpe quite different from that of the other forms, curved, denticulate, strongly widened at apex, the upper prong curved downwards.

Hab. Guatemala; Honduras (*vide* Doubleday, but there are no Honduras specimens in the British Museum, only West Mexican ones!).

In the Tring Museum 9 ♂♂ from: Ciudad de Guatemala (Rodriguez); Guatemala.

e. P. garamas syedra Godm. & Salv. (1878).

Papilio syedra Godman & Salvin, *Proc. Zool. Soc.* p. 271. n. 19 (1878) (Chiriqui); *id.*, *Biol. Centr. Amer., Lep. Rhop.* ii. p. 239. n. 77. t. 72. fig. 4. ♂, 5. ♀ (1890) (Costa Rica; Chiriqui).

♂. *Upperside*.—Forewing: cell-patch of even width; five to seven submarginal spots, third the largest, fifth and following thin.—Hindwing: median band entering cell, more strongly and regularly dentate than in *electryon*; blue patches large; no submarginal spots; tail long, spatulate, teeth M¹ and M² also long.

Underside: apex of forewing and basal area of hindwing as pale brown as in *baroni*; dentition of median band of hindwing as in *electryon*, the orange-red border deeper in colour, broader in between the veins.

♀ like ♂: seven submarginal spots on forewing; median band of hindwing partly edged with orange-red above; no submarginal spots.

Genitalia: Tenth tergite shorter than in *P. g. electryon*; harpe peculiar, twisted, lower process long, gradually broadening proximally, the upper process, which is short, appearing as a tooth at the dorsal edge of the harpe.

Hab. Costa Rica; Chiriqui.

In the Tring Museum 10 ♂♂, 1 ♀, from: Azahar de Cartago, Costa Rica (Underwood); San José, May—June 1899, Guatil Piris, December 1901 and February 1903, Costa Rica (Underwood); Chiriqui (Gounelle); Chiriqui.

118. *Papilio homerus* Fabr. (1793).

Papilio Eques Achirus homerus Fabricius, *Ent. Syst.* iii. 1. p. 29. n. 85 (1793) (America; "Latham coll." false, teste Donovan); Esper, *Ausl. Schmett.* p. 190. n. 85. t. 46. fig. 1 (1796).

Papilio homerus, Donovan, *Nat. Repos.* ii. *Ent.* t. 19 (1823) (Jamaica); Godart, *Env. Méth.* ix. *Suppl.* p. 811. n. 105-6 (1824); Boisd., *Spec. Gén. Lép.* i. p. 345. n. 185 (1836); Doubl., *Westw. & Hew., Gen. Diurn. Lep.* i. p. 13. n. 83. t. 4. fig. 1. ♀ (1846) (Jamaica); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 23. n. 104 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 31. n. 111 (1856); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863) (West Indies); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 309. n. 288 (1864) (Jamaica); Kirby, *Cat. Diurn. Lep.* p. 542. n. 160 (1871); Rutherf., *Ent. Mo. Mag.* xv. p. 28 (1878) (Jamaica, habits); Butler, *Proc. Zool. Soc. Lond.* p. 481. n. 36 (1878) (Jamaica); Gosse, *Proc. Ent. Soc. Lond.* p. 55 (1879) (larva; habits); Oberth., *Et. d'Ent.* iv. p. 74. n. 226 (1880) (Jamaica); Lucas, *Bull. Soc. Ent. France* p. 64 (1883) (Jamaica); Aaron, *Canad. Ent.* xxv. p. 258 (1893) (S. Domingo, Cibas range; Jamaica, Sulphur R. and Devil's R.; *Ipomoea* food-plant of larva); Panton, *Journ. Ins. Jamaica* i. p. 375 (1893); Fox & Johns., *Ent. News* iv. p. 3 (1893) (Pt. Antonio, Jamaica); Haase, *Untersuch. Mimicry* i. p. 95 (1893); Taylor, *Ent. News* v. p. 101 (1894) (descr. of larva and pupa; on "Water Wood," prob. *Chimarrhis cymosa*, Nov. 27); id., *Trans. Ent. Soc. Lond.* p. 409 (1894) (larva and pupa); Kirby, in Allen's *Nat. Libr., Lep. Butt.* ii. p. 282 (1896) (Jamaica); Swains., *Journ. N. York Ent. Soc.* ix. p. 77 (1901) (larva, on *Thespesia populnea*); Robins., *Ent. News* xiv. p. 19 (1903) (capture of a series); Swains., *Proc. Ent. Soc. Lond.* p. 55 (1904).

Felder, and also Haase, regarded this species as a near ally of *P. machaonides*. However, it is closely related to *P. garamas* (= *asclepius*), near which it was placed by Oberthür. The shape of the hindwing is practically the same in *P. homerus*, *garamas*, *warseeviczi*, and *judicaël*. The serration of the costal margin of the forewing is not quite so strong in *P. homerus* and *garamas* as in the other species. The agreement in pattern between *P. homerus*, *warseeviczi*, *cacicus*, *garamas*, etc., is easily perceived in spite of the specific differences. The white spot on the palpus so characteristic for *P. aristeus*, *P. cleotas*, and allies is also preserved in *P. homerus*. The cell of the hindwing of *P. homerus* is short and broad, being widest near the apex, as in many specimens of *P. garamas syedra*.

Genitalia: ♂. Tenth tergite broad proximally, strongly narrowing towards apex; sternite on each side with short projections, the anterior one being somewhat acuminate, anally in middle a conical tooth as in *P. aristeus*; harpe similar to that of *P. aristeus*, nearly as long as the clasper, linear, flat, truncate at apex, the two angles produced into a straight thornlike process, the lower one being sometimes very short.—♀. Edge of vaginal orifice anteriorly raised into a short, broad, smooth, rounded tubercle, which is concave on the posterior side; on each side far back a high ridge which separates further frontad into two ridges, the inner one ending in a long acute process as in *P. aristeus* and allies.

Early stages described by Taylor, *l.c.*

Hab. Jamaica; Santo Domingo (interior of, teste Aaron, *l.c.*).

In the Tring Museum 3 ♂♂, 6 ♀♀ and 1 pupa.

In coll. H. J. Adams a fine series of 7 ♂♂, 8 ♀♀.

119. *Papilio warscewiczii*.

♂. *Papilio warscewiczii* Hopffer, *Stett. Ent. Zeit.* xxvii. p. 29. n. 11 (1866) (Bolivia).

♂. *Underside* of abdomen densely covered with tawny-olive hair-scales, similar hairs on the breast. Costal margin of forewing serrate; two rows of spots on *upperside*, no cell-patch, discal row sometimes partly obsolete, the two rows almost parallel, the submarginal row angulate at SC^5 , the first two spots being more distal than the third spot, the submarginal spots larger than the discal ones, except the two upper ones.—Hindwing with long obtuse tail, teeth M^1 and M^2 being also prolonged; submarginal spots large, creamy or yellowish, shaded with black, a discal band or a row of spots of the same colour, distant from cell, the spots often obsolete, a postdiscal row of blue spots.

Underside resembling *P. cleotas* in so far as there is the same kind of markings, though differently developed; forewing black from base to hinder angle and anteriorly beyond cell (as far as the wing is covered by the hindwing, when at rest), apical area cinnamon like the hindwing; a creamy or yellow cell-patch; discal and submarginal spots larger than above, the upper submarginal spots often enlarged to broad patches.—Hindwing: a broad continuous discal band, its inner edge even, slightly curved, the outer edge crenate, the band creamy white, often washed with cinnamon; submarginal spots the same colour, large, upper ones often much enlarged, extending from edge of wing to discal band, being either merged together with the latter or separated from it by their cinnamon crescents; hairs in posterior area tawny-olive; shoulder often creamy.

♀ not known.

Genitalia: Tenth tergite very long, subprismatical, the underside being somewhat roof-shaped except at apex, which is flat above and below, appearing sinuate beneath in lateral view: sternite strongly chitinised laterally, separated by an oblique groove into a larger anterior portion which is produced into a proximal and a distal tooth, both more or less denticulated, and into a smaller posterior portion which is obtuse. Harpe similar to that of *P. aristeus*, flat, with two apical processes.

Early stages not known.

Hab. Ecuador to Bolivia.

Three subspecies.

a. *P. warscewiczii jelskii* Oberth. (1881).

Papilio jelskii Oberthür, *Et. d'Ent.* vi. p. 113. n. 1. t. 20. fig. 6 (1881) (Tambillo, Peru); Dognin, *Léop. Loja* p. 14 (1887); id., *l.c.* p. 37 (1891).

♂. Similar to the next form; discal spots of forewing ill-defined; the underscales being all black, except in the spots at costal margin.—Discal band of hindwing rather strongly curved; ill-defined; blue spots narrow, curved; last submarginal spot orange-red.

Discal spots on *underside* of forewing large and brown, distal marginal area much widened before middle. Posterior brown postdiscal spot R^3 — M^1 of hindwing smaller than in the other forms; submarginal spot M^1 — M^2 orange in middle.

Genitalia (Loja specimen): Tenth tergite broad, non-spatulate, apex less curved downward than in the Bolivian form; first and second tooth of sternite close together, the interspace being much smaller than that between the second and third, the first tooth long, strongly denticulate. Upper prong of harpe much longer than the lower one, both straight.

Hab. Loja, Ecuador; North and North-West Peru: Chachapoyas, Tambillo.
 In the Tring Museum 1 ♂ from Loja.
 In coll. Oberthür several males from Tambillo and Chachapoyas.
 In coll. Dognin a series from Loja.

b. P. warscewiczii mercedes subsp. nov.

Papilio warscewiczii, Hopffer (*non id.*, 1866, err. det.), *Stett. Ent. Zeit.* xl. p. 54. n. 30 (1879) (Chanhamayo); Druce, *Proc. Zool. Soc. Lond.* p. 246. n. 20 (1876) (Cosnipata).

♂. Closely agreeing with the preceding form; discal spots of forewing *above* on the whole larger; blue spots of hindwing broader; brown distal marginal border of *underside* of forewing narrower before middle, and discal spots R³—M² smaller; brown postdiscal band of hindwing on the whole broader, especially spot R—M¹, submarginal spot M¹—M² without orange scales.

Genitalia: Tenth segment similar to that of the next form, the second tooth of the sternite standing close to the third; both prongs of the harpe straight, usually of the same length as the lower one, a little shorter than the upper.

Hab. Central Eastern Peru: Huánuco.

In the Tring Museum 11 ♂♂ from: Pozuzo, Huánuco, 800—1000 m. (W. Hoffmanns), *type*; Chanhamayo (W. Hoffmanns); Cnshi, Huánuco, 1820 m. (W. Hoffmanns); Huancabamba, Junin (Böttger).

c. P. warscewiczii warscewiczii Hopff. (1866).

Papilio warscewiczii Hopffer, *Stett. Ent. Zeit.* xxvii. p. 29. n. 11 (1866) (Bolivia); Hewits, *Exot. Butt.* iv. *Pap.* t. 10. fig. 30. ♂ (1869) (Apolobamba, *type* of *soratensis*); Kirby, *Cat. Diurn. Lep.* p. 537. n. 128 (1871).

Papilio soratensis Godman & Salvin, *Ann. Mag. N.H.* (4). ii. p. 152. n. 26 (1868) (Apolobamba).

Papilio warscewiczii (?), Weeks, *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumani).

♂. Markings of *upperside* on the whole paler than in the previous forms, less yellow. Discal spots of forewing much smaller than the submarginal ones, often minute and some of them absent. Discal band of hindwing broken up into spots, sometimes vestigial.

Discal band of hindwing *below* usually entering cell, in many specimens this band and the submarginal spots washed with brown.

Genitalia: Apex of tenth tergite more strongly curved downwards than in the other forms; sternite as in *mercedes*, dentition individually variable. Upper prong of harpe strongly curved, often several minute teeth on and in between the two prongs.

Hab. Bolivia and South-East Peru.

In the Tring Museum 22 ♂♂ from: R. Inambari, S.E. Peru, 1000 m., July 1900 (Simons); Chirimayo, 1000 ft., July 1901, R. Sinceri, June 1901, 2500 ft., S. Domingo, 6000 ft., January 1901, and Limbani, April 1904, Carabaya, S.E. Peru (G. Ockenden); Charuplaya, Bolivia, 1300 m., May 1901 (Simons); S. Antonio, Bolivia, 1800 m., March—June 1896 (Garlepp); R. Tanampaya (Garlepp); R. Sougo, Prov. Yungas (Garlepp); Bueyes.

120. *Papilio cacicus* Lucas (1852).

Papilio cacicus Lucas, in Guérin, *Rev. Zool.* (2). iv. p. 132 (1852) (Colombia).

♂. Closely allied to *P. warscewiczii*; forewing with three bands on *upperside*: a creamy yellow median band interrupted at lower angle of cell, the posterior

portion being continuous with a variable cell-patch, which is rarely absent, a postdiscal row of glaucous buff spots, and a row of submarginal spots of which the posterior one, two, or three are orange, cell-patch sometimes washed with orange.—Hindwing with a broad creamy or creamy yellow median band, tapering behind, always entering cell; a postdiscal row of blue spots; and a submarginal row of creamy ones, sometimes shaded with black; last spot orange as a rule, usually merged together with the marginal one.

Underside: apical area of forewing and the hindwing cinnamon-brown.—Forewing: discal band and cell-patch broader than above, upper submarginal spots absent or vestigial.—Discal band of hindwing milky white or creamy, wider posteriorly than above, externally bordered by black bars or crescents, except towards costa; submarginal spots vestigial.

♀. Trichromatic; one form like male, but wings broader, band of hindwing wider. The other forms with large cell-patch and complete discal band on forewing which are tawny-orange or white; hindwing without discal band on *upperside*, the band vestigial on *underside*.

Genitalia: ♂. Tenth tergite long, curved, transversely dilated beneath at the base, apex sharply pointed; sternite divided at each side by a transverse groove into two processes, the first being strongly chitinised and pointed, and the second being paler and obtuse. Harpe vestigial, being represented by a flat piece of chitin of about half the length of the clasper, not separated from the latter, tip acuminate.—♀. Edge of vaginal orifice and the area around strongly chitinised, the cavity in which the orifice proper is situated appearing heart-shaped, the edges of the cavity meeting behind the orifice, forming here a brown tubercle; within this cavity several transverse folds, and in front of the cavity also some transverse folds; no processes.

Early stages not known.

a. *P. cacicus cacicus* Lucas (1852).

Papilio cacicus Lucas, *l.c.*; Donbl., Westw. & Hew., *Gen. Diurn. Lep.* ii. p. 529 (1852); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 40. n. 203 (1852) (Quito); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 55. n. 214 (1856); Lucas, in Casteln., *Voy. Amér. Sud, Léop.* p. 199. t. 1. fig. 3. ♂ (1857) (Colombia); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 313. n. 340 (1864) (Ecuador; Colombia); Kirby, *Cat. Diurn. Lep.* p. 537. n. 127 (1871) (Amer. mer.); Oberth., *Et. d'Ent.* iv. p. 74. n. 224 (1880) ("Brazil" error loci); id., *l.c.* vi. p. 4. n. 8 (1881) (Muzo, ♀); Honr., *Deutsche Ent. Zeit.* p. 223 (1889) (*zaddachi* = ♀ of *cacicus*); Dewitz, *ibid.* p. 224 (1889); Habel, *Iris* iii. p. 194 (1890) (Mérida); Maass. & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 31. n. 132 (1890) (Colombia); Haase, *Untersuch. Mimicry* i. p. 94 (1893); Haensch, *Berl. Ent. Zeitschr.* xlviii. p. 151 (1903) (Balzapamba, W. Ecuador).

Papilio zaddachi Dewitz, *Mitth. Münch. Ent. Ver.* i. p. 85. t. 2. fig. 1 (1877) (Colombia); id., *Deutsche Ent. Zeit.* p. 332 (1888) (distinct from *cacicus*; against Honrath).

Papilio cacicus ab. ♀ *zaddachi*, Honrath, *Berl. Ent. Zeit.* xxxii. p. 253 (1888) (a second specimen of this form of ♀ from Colombia; not specifically distinct from *cacicus*).

♂. There is considerable variability in the size of the markings.—Forewing: the cell-patch, which is occasionally washed with orange, is sometimes a broad band reaching across the cell, while it is reduced in other specimens to a small spot, being altogether absent in one of our specimens from Bogota.—In this Bogota individual the band of the hindwing is more distal in position than usually, just entering apex of cell.

♀. Trichromatic.

a'. ♀-f. *cacicus* similar to the male.

b. ♀-f. zaddachi Dewitz, *l.c.*—Discal band of forewing continuous, not being interrupted at apex of cell, and like the large patch in cell tawny-orange; hindwing without discal band on *upperside*, the band being vestigial below.

c'. ♀-f. nais nov.—Like the preceding, but the discal band and cell-patch of forewing white. Coll. Oberthür.

Hab. Mérida; Colombia; Ecuador.

On comparison of a larger material than we have examined it will perhaps be found that there are several subspecies in the districts mentioned. In Mérida specimens the last submarginal spot of the forewing, on *upperside*, appears to be always (?) absent or vestigial; in our two individuals from the Canca valley and the Rio Dagna the first spot of that row is obsolescent and the last small, the band of the hindwing being also more evenly tapering than in Bogota specimens.

In the Tring Museum 16 ♂♂, 1 ♀, from: Mérida, Venezuela, June 1898 (Briceño); "Bogota"; Bogota to Pandi, December 1896, dry season (Dr. Bürger); Pereira, Canca; R. Dagna, west coast of Colombia (W. Rosenberg); Ecuador.

In coll. Oberthür from Ambato and Balsapamba, Ecuador.

b. P. cacicus inca subsp. nov.

Papilio cacicus, Hopffer, *Stett. Ent. Zeit.* xl. p. 54. n. 29 (1879) (Peru; this form?).

♂. *Upperside*.—Forewing: cell-patch much more oblique than in the preceding, forming a very acute angle with M on basal side; last three spots of postdiscal row close to the submarginal spots; first submarginal spot vestigial, second small, the others also smaller than in *c. cacicus*, partly shaded with black, last one orange-red.—Hindwing: discal band more convex distally than in the preceding subspecies, broad anteriorly, strongly tapering; blue postdiscal spots large; submarginal spots narrow, shaded with black, no orange anal spot; black discal area wider centrally than in the preceding, the wing being longer in middle; tail narrow, non-spatulate.

Underside.—Forewing: discal band extending to base of M², its proximal edge almost on a level with the edge of the cell-patch, which is more proximal than in the previous subspecies; black discal area much wider in middle than in front and behind; upper postdiscal spots large, contiguous, forming an oblique band, posterior spots of that row thin, close to the submarginal spots.—Hindwing: black discal bars sharply defined, uniform, separated from the discal band by a narrow interspace of the brown ground-colour; a minute orange-red anal submarginal spot, separated from fringe.

Genitalia: Anterior process of tenth tergite shorter than posterior one; apex of harpe not raised into a small tubercle or point.

Hab. Eastern Peru: Upper Rio Toro, Chachamayo district, August—September 1901 (Simons).

1 ♂ in the Tring Museum; not seen in other collections, but the specimen recorded by Hopffer, *l.c.*, may belong here.

121. *Papilio euterpinus* Godm. & Salv. (1868).

Papilio euterpinus Godman & Salvin, *Ann. Mag. N. H.* (4). ii. p. 150. n. 24 (1868) (Guadalquiza, Ecuador); Hewitts, *Exot. Butt.* iv. *Pap.* t. 10. f. 31. ♂ (1869) (type in G. & S. coll.); Kirby, *Cat. Diurn. Lep.* p. 538. n. 143 (1871); id., *Trans. Ent. Soc. Lond.* p. 351 (1881) (Chiquinda; moist places at a high elevation; descr. of worn ♀); Staud., *Exot. Tugf.* p. 15 (1884); Hulse, *Untersuch. Mimicry* i. p. 94 t. 11. fig. 83. ♂ (1893) (Ecuador.—neuratiou erroneus in fig.); Haensch, *Berl. Ent. Zeitschr.* xlviii. p. 153 (1903) (Sa. Inez, R. Pastaza, 1250 m.).

This peculiar species has generally been associated with *P. zagreus*. However, its true position is near *P. cacicus* and *P. warsceviczi*, with which it agrees in the short antenna, serrate costal margin of the forewing, the short cell of the hindwing, the origin of the subcostal vein of the hindwing from close to the base of the subbasal cellule, the hairs of the underside of the body and hindwing, and in the genitalia (of ♂, ♀ not examined). The hindwing has lost the tails and the markings, only the submarginal row being represented by two or three orange spots situated from anal angle forwards, the row being sometimes continued by some olive-buff spots. The cell-patch of the forewing and the three discal spots R²—M² correspond to the respective spots of *P. cacicus*, the two posterior discal spots being prolonged as in *P. aristens bitias*, usually touching the submarginal dots, which are homologous to the posterior orange submarginal spots of *P. cacicus*. On the underside the pattern of the forewing agrees often rather closely with that of *P. cacicus cacicus* ♀-f. *zaddachi* in the discal row of patches being continued to costal margin by some orange and creamy spots situated at the distal side of the cross-veins.

Genitalia : ♂. Tenth tergite very broad, rounded at apex, beneath at base transversely dilated as in *P. cacicus*; sternite on each side with only one long acute process, which is somewhat angulate on the anal side; this process is homologous to first and second process of *P. cacicus*, the first process being shifted anad in *P. euterpinus* and the two processes having become merged together, the small projection on the hinderside of the long process of *P. euterpinus* being homologous to the second process of *P. cacicus*. Harpe as in *P. cacicus*, but a little longer, not so completely fused with the clasper, the edges and especially the acuminate apex being free.

Early stages not known.

Hab. West Colombia; Ecuador; North Peru.

In the Tring Museum 2 ♂♂ from : Sante Inez (R. Haensch); Zamora (O. T. Baron).

In coll. Oberthür 7 ♂♂ from : Honda, West Colombia; Moyobamba and Chachapoyas, Peru.

A ♀ in coll. H. Grose-Smith from Chiquinda.

SECTION III.—KITE-SWALLOWTAILS.

(For characters see p. 434.)

There is considerable divergency among the New-World Kite-Swallowtails, the American forms presenting a greater variety in structure, shape, and pattern than the Old-World species. The two types of hindwing, the tailed triangular type and the non-tailed rounded type, which we find in the Eastern Hemisphere, obtain also in America, but here the two types are connected by a third type, a more or less rounded hindwing bearing a thin tail (*dolicæon* and allies). The development of the subcostal veins of the forewing exhibits interesting features in this Section of Papilios. In one of the American species the first subcostal is lost (*bellerophon*)—the only instance among true Swallowtails of a reduction in the number of veins. We take as the most generalised state that venation in which the five subcostals are all present, and end free in the margin of the wing. This state obtains in a large percentage of American species, while only two Old-World species have the same neuration—namely, the Palaearctic *podalirius* and the Australian *leosthenes*,

none of the African Kite-Swallowtails having all the subcostals free. The next phyletic stage is represented by those species in which the first subcostal is anastomosed with the costa, and in the third stage both the first and second subcostals are joined to the costa. Both the less and the more advanced specialisations are observed among the American Papilios, some of the species exhibiting a remarkable fluctuation in this respect among the individuals.

The scent-organ in the abdominal fold of the hindwing of the males is another structure which exhibits interesting variety among these Papilios, and striking variation within many of the species. The scent-scales differ in some of the species enormously, while in others the differences are less marked, and in others again the scent-scales are apparently identical. The geographical variation of the scent-organ is very marked in several species of this Section. In quite a number of American and Old-World species the scent-organ is vestigial or absent, though the fold remains always slightly indicated at the base of the wing.*

The genitalia of the American Kite-Swallowtails are in some groups of great uniformity, while they are different in every species, and sometimes even subspecies, in other groups. One organ, the tenth abdominal segment of the male, is however of remarkable constancy all through the American species of this Section, with the exception of one species (*P. celadon*), which one would not expect to deviate so much from the normal, considering that the aberrant-looking mimetic forms have the tenth tergite of the same trifold type as *P. protesilaus*, *dolicaon*, *marcellus*, etc. This exception from the normal is instructive. It is one of the instances we meet with so frequently among Lepidoptera of the simplification of an organ by reduction, the tenth tergite of *P. celadon* having become simple in consequence of the loss of the side-lobes.

The edge of the eighth abdominal tergite of the male is very characteristically modified in the American Kite-Swallowtails, the smooth erect scaling at this edge not being met with in other American Papilios.

We know deplorably little about the larvae and pupae of the various species. There are some points in the variability of the species, especially the mimetic ones, which breeding from a female would put beyond dispute. Under *P. phaon* and *P. lysithous* we have united quite a number of differently coloured forms which other authors have considered distinct species. Though we have no doubt about these insects being polymorphic, it is nevertheless desirable that this polymorphism be investigated by breeding from the eggs.

The following two generic names have American species as types :

Iphioides Hübner, *Verz. bek. Schmett.* p. 82 (1818?) (type: *dolicaon*).

Eurytides Kirby (ex Hübner, *indescr.*), in Allen, *Nat. Libr., Butt.* ii. p. 272 (1896) (type: *dolicaon*).

Since some Old-World species are apparently close allies of American species, and may perhaps come into one or the other American Group when we classify all the Papilios, we abstain from giving a detailed characterisation of the two Subsections in which the American Kite-Swallowtails fall.

SUBSECTION E.

Underside of wings with red spots at the base, or hindwing with a red line parallel to abdominal margin, extending from costal margin before middle towards the anal angle. Subcostals of forewing always free.

* The result of our investigation into the variation of this organ will be the subject of a special paper.

Here come three groups :

- a.* Underside with red spots at base, either on both wings or only on hindwing *Lysithous Group.*
- b.* Underside of hindwing with red line parallel to abdominal margin, extending from costal edge proximally of middle in the direction of the anal angle, being bordered with black on both sides at least at costal margin *Marcellus Group.*
- c.* Red line on underside of hindwing as before, but bordered with black only on one side *Protesilaus Group.*

SUBSECTION F.

Underside of hindwing with a red or tawny band on disc parallel (or nearly) with distal margin, commencing beyond middle of costa, or no red or tawny band or spots on underside.

- d.* Hindwing below with red or tawny line (or row of spots) parallel with distal margin; first subcostal of forewing free *Thyastes Group.*
- e.* Hindwing below without red line; SC¹ of forewing anastomosed with C *Doliceon Group.*

XIII. Lysithous Group.

With the exception of *P. asius*, which stands a little apart, the species of the present group are all closely related with one another. They resemble in pattern various members of the Aristolochia-Papilios, with which they have been associated by nearly every author, Haase alone having recognised their close relationship with the *Marcellus* Group. The red basal spots on the underside of the wings are a distinguishing character peculiar to these mimics. The species are modifications of an ancestral form which, in the shape of the hindwing, the number of red basal and subbasal spots on the same, and the development of the scent-organ in the abdominal fold, resembled *P. asius*. This insect has preserved the triangular shape of the hindwing peculiar to the *Marcellus*, *Protesilaus*, and *Leucaspis* Groups, while in most other species of the Mimetic Group the hindwing has assumed a more or less rounded shape. Of the five red markings in the basal area of the underside of the hindwing of *P. asius* the other mimics have preserved only four, three or two, the spot between C and SC not being marked in any other species. One should expect this spot to be occasionally vestigial in the species with four red spots (*P. ilus*, *branchus*, *thymbraeus*, etc.), but we have not come across a specimen in which such a spot is indicated.

The scent-organ of *P. asius* is far less reduced than that of the other species. With the exception of *P. asius*, the abdominal edge of the hindwing (δ) is not curved upwards, and the scent-scales are restricted to the basal third or half, forming a narrow greyish stripe. In several species (*P. protodamas*, *pausanias*, and *xynias*) the scent-organ is altogether lost, while in *P. euryleon* it is lost only in the subspecies from East Ecuador. The scent-scales of *P. asius* are similar to those of *P. agesilaus*, being spindle-shaped, with both poles produced into a threadlike

process. In the other species the scent-scales resemble narrow ordinary non-dentate scales.

The genitalia are of great sameness, the differences between the species, if there are any constant differences, being very slight. They agree also closely with the genitalia of *P. philolaus*.

The larva is bright-coloured, bearing numerous longitudinal bands and behind the middle a V-shaped dorsal patch, the thorax being dotted; no spinelike tubercles. The pupa is short; the abdomen is widest in middle, being somewhat barrel-shaped.

Sixteen species :

- | | | |
|----|---|------------------|
| a. | Forewing below without red spots | b. |
| | Forewing below with one or two red spots | h. |
| b. | Hindwing below with two red spots at costal margin | c. |
| | Hindwing below with one red spot at costal margin | g. |
| c. | Hindwing below with five red spots at base, there being a spot between C and SC | Species No. 137. |
| | Hindwing below with four red spots at base, there being no spot before SC | d. |
| d. | Hindwing with red band on disc | e. |
| | Hindwing with straw-coloured band across both wings | Species No. 123. |
| e. | Forewing all black, or a white spot or patch on disc at and near lower angle of cell | f. |
| | Forewing with large grey patch M^2-SM^2 , besides some other greyish or buffish patches | Species No. 132. |
| f. | Red band of hindwing distant from cell | Species No. 134. |
| | Red band of hindwing close to cell | Species No. 133. |
| g. | Hindwing without markings on upperside, except a row of small white submarginal lunules | Species No. 122. |
| | Hindwing with red, or buffish green, or straw-coloured band or patch | h. |
| h. | Posterior segments of abdomen and sterna with red spots | i. |
| | Thorax and abdomen with buffish markings | Species No. 124. |
| i. | Forewing with a submarginal row of buffish straw-coloured spots, discal patches absent or vestigial | j. |
| | Forewing with large patches on disc, either in centre or before inner margin; hindwing with red discal patch or band | Species No. 126. |
| j. | Hindwing with pale pink band on upperside from R^1 to abdominal margin | Species No. 127. |
| | Hindwing with greyish green or greyish blue discal band, or the whole central area this colour, or the band carmine red and extended to costal margin | Species No. 125. |
| k. | Forewing with two red spots at base! | l. |
| | Forewing with one red spot at base standing at costal margin, the cell spot being absent | m. |
| l. | Hindwing with tail; posterior basal spot of hindwing produced to form a streak | Species No. 136. |
| | Hindwing without tail; posterior basal spot of hindwing a dot | Species No. 131. |

- m.* Hindwing with four basal spots on underside, there being two spots at costal edge Species No. 135.
 Hindwing with two or three basal spots, one only at costal edge *n.*
n. Patch of upperside of forewing pale green (♂; ♀ not known) Species No. 130.
 Patch of upperside of forewing grey or white, or absent *o.*
o. Hindwing rounded, red spot R^3-M^1 of upperside usually larger than spot M^1-M^2 Species No. 128.
 Anal angle of hindwing more produced, red spot R^3-M^1 of upperside not larger than spot M^1-M^2 Species No. 129.

122. *Papilio pausanias* Hew. (1852).

Papilio pausanias Hewitson, *Tr. Ent. Soc. Lond.* (2), ii. p. 22. t. 6. fig. 2 (1852) (British Guiana; Ega).

♂♀. Abdomen with broad buffish lateral streak. Forewing proximally and nearly the whole upper surface of the hindwing metallic greenish blue; a straw- or primrose-yellow area on forewing, consisting of a large cell-patch and two large discal patches R^3-M^2 , there being often a small additional spot before R^2 and another behind M^2 .—Hindwing without discal markings, but with a row of more or less distinct white curved submarginal bars; shape of hindwing variable, distal margin (apart from dentition) often straight, especially in female.

Underside brown, without distinct black cell-streaks; hindwing with three red basal spots which are often developed to streaks; a row of red postdiscal lunules, also often produced basad, forming more or less distinct streaks.

Scent-organ absent, vein SM^2 being clothed with metallic blue scales, only a few of the scales being greyish.

Genitalia not essentially different from those of *P. protodamas*; the dorso-ventral dentate ridge of the harpe ventrally a little more curved, apical lobe a little larger, and the teeth beneath this lobe rather more numerous.

Early stages not known.

Hab. Costa Rica southward to Bolivia and the Brazilian province of Goyaz.

Three subspecies.

a. P. pausanias prasinus subsp. nov.

♂. Similar to *cleombrotus*. *Upperside* of wings more green in tint, this metallic colour also more extended, the costal area of the hindwing being hardly less metallic green than the disc.—Forewing rather shorter; discal patches longer, reaching three-fourths the way from cell to distal margin.—Hindwing: white submarginal spots minute, upper ones vestigial, practically absent both above and below; red basal spots of underside smaller than in *cleombrotus*.

Hab. Carillo, Costa Rica, June—July 1903 (C. Underwood); one ♂ in the Tring Museum.

b. P. pausanias cleombrotus Streck. (1885).

Papilio cleombrotus Strecker, *Proc. Ac. Nat. Sc. Philad.* xxxvii. p. 175 (1885) ('Upper Amazons' error loci); id., *Lep. Rhop. Het. Suppl.*, iii. p. 17 (1900) ('Pebas' false).

The locality given for this form by Strecker is erroneous. We know the subspecies only from the West Coast of Colombia, but it occurs presumably also in

Panama, whence Strecker had received Lepidoptera. The description fits our specimens from the Rio Dagua.

♂. Pale apical patch of forewing absent; posterior area of forewing and distal area of hindwing more extended metallic green-blue, costal area of hindwing practically black. *Underside* deeper black-brown than in *P. p. pausanias*; red basal spots of hindwing not prolonged to streaks, no pale or reddish streaks on disc; red postdiscal spots, especially the last one, larger than in *P. p. pausanias*. Forewing occasionally with vestiges of creamy submarginal spots on upper as well as on underside.

♀ not known.

Hab. Rio Dagua, West Colombia.

In the Tring Museum 6 ♂♂ (W. F. H. Rosenberg).

2 ♂♂ from Juntas, R. Dagua, in coll. Oberthür.

c. P. pausanias pausanias Hew. (1852).

Papilio pausanias Hewitson, *l.c.* (1852); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* ii. p. 529 (1852); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 69. n. 313 (1852) (Ega; var. a. "Honduras and Guatemala," no such specimens in Brit. Mus.); id., *List Lep. Ins. Brit. Mus. i. Pap.* p. 80. n. 330 (1856) (Ega; Demerara; "var. a" excl.); Wall., *Trans. Ent. Soc. Lond. (2).* ii. p. 255 (1854) (Amazons; banks of rivers); Ménétr., *Enum. Corp. Anim. Mus. Petrop., Lép.* i. p. 6. n. 94 (1857) (Brazil); Bates, *Trans. Ent. Soc. Lond. (2).* v. p. 335 (1861) (Villa Nova; Ega; habits different from those of its model, *Heliconius clytia*); id., *Journ. Entom.* i. p. 224. n. 7 (1862) (Upp. Amazons as far down as Villa Nova); Felder, *Verh. Zool. Bot. Ges. Wien.* xiv. p. 299. n. 153 (1864) (Demerara; Amazons; Venezuela; Bogota; "Honduras, Guatemala"—error loci); Kirby, *Cat. Diurn. Lep.* p. 524. n. 52 (1871) (Amer. mer.); Druce, *Proc. Zool. Soc. Lond.* p. 245. n. 10 (1876) (Peru; Chamicuras); Hopff., *Stett. Ent. Zeit.* xl. p. 52. n. 17 (1879) ("Brazil," Surinam, Brit. Guiana, Venezuela, N. Granada, Bolivia;—"Honduras, Guatemala" error loci); Oberth., *Et. d'Ent.* iv. p. 97. n. 296 (1880) (Ecuador; Santarem); Staud., *Erz. Tagb.* i. p. 12. t. 8 (1884) (Para to Peru; Colombia); Maass & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 24. n. 104 (1890) (Villavicencio, 450 m.); iid., *l.c.* p. 31. n. 126 (1890) (Colombia); Hahnel, *Iris* iii. p. 268 (1890) (Teffé); id., *l.c.* p. 285 (1890) (Pebas); Haase, *Untersuch. Mimierj.* i. p. 87 (1893); Michael, *Iris* vii. p. 213 (1894) (Sao Paulo de Olivença; ♀ seen).

Papilio hermolanus Guenée, *Mém. Soc. Phys. Hist. Nat. Genre* xxiii. p. 379 (1872) (♀, Porto Cabello;—now in coll. Oberthür); Hew., *Pet. Nouv. Ent.* p. 213 (1872) (= *pausanias*); Kirby, *ibid.* p. 809. n. 52 (1877) (= *pausanias*); id., *Cat. Diurn. Lep.* p. 239 (1872) (= *pausanias*).

Papilio pausanias (!), Weeks, *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumani).

♂♀. Apex of forewing with large greyish patch, the black upper scales being mostly absent from this patch.—*Underside* of hindwing with pale discal streaks which join the red postdiscal spots; red basal spots variable in length; outline of hindwing variable, in our Bogota female the hindwing short, being sharply truncate, in other females hindwing not shorter than in male, or even more rounded than in that sex.

Hab. Central Colombia to the Guianas, southward to Bolivia and the province of Goyaz in Brazil.

In the Tring Museum 30 ♂♂, 2 ♀♀, from: "Bogota"; Ecuador; La Vuelta, Canra R., Orinoco, May 1904 (S. M. Klages); Rio Demerara; Surinam; Ega; Pebas; R. Uaupes, Upper R. Negro; Iquitos (Stuart); Rioja, near Moyobamba; R. Chuchuras, affl. of R. Palcazu, 320 m. (W. Hoffmanns); Guanay and Mushay, R. Mapiri, Bolivia (Stuart); Jatahy, Goyaz.

123. *Papilio microdamas* Burm. (1878).

Papilio microdamas Burmeister, *Descr. Rép. Argent.* v. Lép. p. 63. n. 5 (1878) (Corrientes); *id.*, *l.c.* *Atlas* p. 19. t. 5. fig. 8. ♀ (1879); Oberth., *Et. d'Ent.* xii. p. 2. n. 5. t. i. fig. 3. ♂ (1888) (Caraça, Brazil).

♂ ♀. Sexes similar. A band of yellowish buff patches from costal margin of forewing to anal angle of hindwing, above and below, straight on forewing, curved on hindwing, variable in tint, somewhat paler on hind- than on forewing; spot within subcostal fork of forewing usually vestigial.—Hindwing with a red anal spot, which is larger above than below, and four red basal spots on underside, the last continuous with a red line on abdominal fold; forewing without red spots.

Scent-organ: numerous narrow grey scales on SM².

Genitalia: ♂. Apical lobe of harpe rather small, dorso-ventral ridge irregularly and rather heavily dentate, central process dentate; ventral process short.

Early stages not known.

Hab. Paragnay and adjacent districts of Argentina; Caraça, Brazil.

In the Tring Museum 5 ♂♂, 2 ♀♀, from: Patino Cué, Paraguay, February (Montforts); Sapucay, Paraguay, September and December (W. Foster); Entre Rios.

124. *Papilio protodamas* Godt. (1819).

Papilio protodamas Godart, *Enc. Méth.* ix. p. 40. n. 45 (1819) (Brazil; "♂" excl.).
Ithobalus hyperion Hübner, *Samml. Exot. Schm.* ii. t. 114 (1822?); Burm., *Descr. Rép. Argent.* v. Lép., *Atlas* p. 6. t. 2. fig. 5 (1879) (larva and pupa).

Godart described as *P. protodamas* a specimen of the present insect, adding the description of another insect which he believed to be probably the ♂ of the former. The first-described insect was, in our opinion, also a ♂, but that point is of no great importance. The name *protodamas* must be applied to the first insect, not to the second, of which Godart says: "Nous avons actuellement à parler d'un individu qui pourrait bien être le mâle de celui-ci."

Hübner, *l.c.*, figures on t. 114 the first insect, to which he gives the new name *hyperion*, and on t. 115 the second insect, to which he applies Godart's name *protodamas*. From the fact that Hübner figures these two insects in the same order as they are described by Godart, and that to one of them the name *protodamas* is given, we conclude (1) that Hübner knew of Godart's descriptions when he put the names on his plates 114 and 115, (2) that Hübner's plates 114 and 115 appeared *after* 1819, the year of issue of Godart's work*, and (3) that *hyperion* sinks as a synonym of *protodamas*, both names being proposed for the same insect. In any case, we give precedence to Godart's names, of which the year of publication is known, since there is no means of proving that Hübner's names have priority.

♂ ♀. Dichromatic in both sexes, the one form possessing on the forewing a large straw-coloured patch in the cell and two large patches on the disc, while the other form has only a vestigial cell-patch and small discal patches; intergradations between the two forms are rare. Scales of discal spots of hindwing either entire or more or less denticulate. Forewing without red spots at base on underside, and hindwing with three red spots.

Scent-organ absent.

Genitalia: ♂. Dorso-ventral dentate ridge of harpe slightly curved towards

* Godart's name *crander* for the Brazilian form of *P. anchisiades* appears on Hübner's pl. 112, which confirms the above statement.

base ventrally ; rounded apical lobe rather small, bearing only very few teeth on its under surface ; apex of central process obliquely truncate, its ventral apical angle acuminate.

Early stages figured by Burmeister, *l.c.*

a. P. protodamas f. protodamas Godt. (1819).

Papilio protodamas Godart, *l.c.* (1819) (Brazil ; "♂" excl.).

Ithobolus hyperion Hübner, *l.c.* (after 1819) ; Kirby, *ibid.* ed. ii. p. 92. t. 327. fig. 1. 2 (190—?).

Papilion hyperion, Boisduval, *Spec. Gén. Léop.* i. p. 319. n. 159 (1836) (Brazil) ; Doubl., *List Lep.*

Ins. Brit. Mus. i. p. 14. (1845) (S. Amer.) ; id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 20.

n. 236 (1846) (Brazil) ; Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 69. n. 310 (1852) ; id., *List*

Lep. Ins. Brit. Mus. i. *Pap.* p. 79. n. 327 (1856) (Rio de Jan.) ; Felder, *Verh. Zool. Bot. Ges.*

Wien xiv. p. 299. n. 150 (1864) (Brazil) ; Kirby, *Cat. Diurn. Lep.* p. 521. n. 26 (1871) (Brazil) ;

Staud., *Exot. Tagf.* i. p. 12 (1884) (Brazil) ; Haase, *Untersuch. Mimicry* i. p. 87, and ii. p. 69

(1893) ; Bönningh., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 28 (1895) (Rio de Janeiro) ;

S. Theresa and Nictheroy) ; Mabilde, *Guia Pract. Borbot. R. Grande do Sul* p. 44 (1896).

Papilio zonaras, Perty, *Del. Anim. Artie.* p. 152. t. 29. fig. 3. 3b (1830-34) (Amazon, false?).

Papilio zonaras (!) Kirby, *l.c.* (1871) (sub syn.).

♂. Forewing with two rows of spots, the upper ones merged together into streaks ; an ill-defined patch in cell, more or less vestigial.

♀. Streaks of forewing less distinct than in ♂, cell-patch absent from upper-side (always?).

Known from Rio Grande do Sul northward to Minas Geraës.

b. P. protodamas f. choridamas Boisd. (1836).

Papilio choridamas Boisduval, *Spec. Gén. Léop.* i. p. 318. n. 158 (1836) (Rio de Janeiro) ; Doubl.,

List Lep. Ins. Brit. Mus. i. p. 14 (1845) ("West Indies, Demerara," error loci) ; id., Westw. &

Hew., *Gen. Diurn. Lep.* i. p. 20. n. 237 (1846) (Brazil ; "Guiana" error loci) ; Gray, *Cat. Lep.*

Ins. Brit. Mus. i. *Pap.* p. 68. n. 309 (1852) ; id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 79. n. 326

(1856) ("Demerara, West Indies," error loci) ; Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 299.

n. 152 (1864) (Brazil) ; "Demerara, Ind. occid.," error loci) ; Kirby, *Cat. Diurn. Lep.* p. 524.

n. 51 (1871) (Amer. mer.) ; Capronn., *Ann. Soc. Ent. Belg.* xvii. p. 9. n. 8 (1874) (Copa Cabana,

Sept. ; Botafogo, Sept.) ; Burm., *Descr. Rép. Argent.* v. *Lép.* p. 7. sub n. 14 (1879) (var. of

hyperion) ; Oberth., *Et. d'Ent.* p. 97. n. 297 (1880) (Brazil) ; Staud., *Exot. Tagf.* i. p. 12 (1884)

(N. Brazil ; Surinam) ; Haase, *Untersuch. Mimicry* i. p. 87, and ii. p. 69 (1893) ; Bönningh., *l.c.*

p. 28 (1895) (Corcovado).

♂ ♀. Forewing with a large patch in cell and two on disc ; submarginal dots variable in size and number, occasionally absent ; the streaks found in apical third of wing of the preceding form usually absent from *choridamas* or only vestigial.

This form is known to us from the provinces of Rio de Janeiro and Minas Geraës.

Hab. of *P. protodamas* : Minas Geraës southward to Rio Grande do Sul.

In the Tring Museum 11 ♂♂, 1 ♀, of *f. protodamas*, from : Minas Geraës ; S. Catharina ; Castro, Parana (C. D. Jones) ; Blumenan.—S ♂♂, 2 ♀♀, of *f. choridamas* from : Minas Geraës ; Copa Cabana, September ; Alto de Theresopolis ; Rio de Janeiro (E. May).

125. *Papilio phaon* Boisd. (1836).

Papilio phaon Boisduval, *Spec. Gén. Léop.* i. p. 319. n. 160 (1836) (Mexico ; Peru ;—coll. Oberthür)

♂ ♀. Sexes similar. Spots of breast and abdomen red, posterior segments of abdomen with red lateral patches ; spot on palpus creamy. Pattern of wings very variable ; markings of *upperside* of forewing usually straw-colour or creamy, the

discal ones of hindwing grey-blue, occasionally replaced by a red band.—*Underside* brownish black; no distinct black cell-streaks; forewing without red basal spot; hindwing with three red spots at base, but the one in cell often vestigial.

Scent-organ: numerous small greyish scales on SM².

Genitalia: ♂. Apical lobe of harpe irregularly rounded; dorso-ventral ridge somewhat curved, dentate ventrally, the lower ventral angle of this ridge not produced basad.

Early stages not known.

Two principal forms, each variable:

a'. P. phaon f. loc. xenarchus Hew. (1861).

Papilio xenarchus Hewitson, *Exot. Butt.* ii. *Pap.* t. 5. fig. 12. ♀ (1861) (Mexico); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 299. n. 147 (1864) (Mexico); Kirby, *Cat. Diurn. Lep.* p. 524. n. 46 (1871); Staud., *Exot. Tagf.* i. p. 12 (1884) (Mexico); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 210. n. 33 (1890) (Jalapa); Haase, *Untersuch. Mimicry* i. p. 87 (1893).

Papilio eridamas Reakirt, *Proc. Ac. Nat. Sc. Philad.* xviii. p. 248. n. 25 (1866) (Mexico); Kirby, *l.c.* p. 524. n. 47 (1871); Godm. & Salv., *l.c.* p. 210. n. 34. t. 67. fig. 10. ♂ (1890) (Mexico; Atoyac, Cordova, Omealca).

♂ ♀. A red band on hindwing, the patches composing the band either large and contiguous (*xenarchus*) or smaller and separate (*eridamas*).

There is a broad-banded male in coll. Godman and another in coll. Charles Oberthür, and two females in coll. Hewitson (Brit. Mus.). Narrow banded specimens appear to occur more often. In a male in coll. Hewitson the red spots are proximally more or less extended grey-blue; a similar transition to the next form is in coll. Standinger.

The red-banded form is known only from Eastern Mexico, where it occurs together with the next, being much the rarer of the two.

b'. P. phaon f. phaon Boisd. (1836).

Papilio phaon Boisduval, *l.c.* (1836) (Mexico;—coll. Oberthür); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 14 (1845) (Honduras; Oaxaca); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 20. n. 239 (1846) (Mexico; Honduras); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 69. n. 311 (1852) (Mexico; Honduras; Venezuela); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 80. n. 328 (1856); Reak., *Proc. Ent. Soc. Philad.* ii. p. 141. n. 14. (1863) (Honduras); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 299. n. 148 (1864); Boisd., *Consid. Léop. Guatem.* p. 6 (1870) (Mexico; Honduras; Costa Rica); Kirby, *Cat. Diurn. Lep.* p. 524. n. 48 (1871) (Mexico; Honduras); Oberth., *Et. d'Ent.* iv. p. 97. n. 298 (1880) (Mexico); Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 126. n. 241 (1880) (Sta. Marta); iid., *Biol. Centr. Amer., Rhop.* ii. p. 211. n. 35. t. 67. fig. 9. genit. (1890) (Mexico; Brit. Honduras; Guatemala; Honduras); Staud., *Exot. Tagf.* i. p. 12. t. 8 (1884) (Mexico; Guatemala; Honduras; Venezuela); Haase, *Untersuch. Mimicry* ii. p. 69 (1893).

Papilio ulopos Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 69. n. 312 (1852) (Mexico;—Mus. Brit.); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 80. n. 329 (1856); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 299. n. 151 (1864) (Mexico); Kirby, *l.c.* p. 524. n. 50 (1871) (Mexico); Oberth., *Et. d'Ent.* iv. p. 117. n. 298^{bis} (1880) (Poloche Valley; = *immarguatus*); Staud., *Exot. Tagf.* i. p. 12 (1884) (Mexico); Godm. & Salv., *l.c.* p. 212. n. 38 (1890) (Mexico; Brit. Honduras; Guatemala; Honduras).

Papilio ulopos (?), Weidemeyer, *Proc. Ent. Soc. Philad.* ii. p. 148 (1863) (Mexico).

Papilio therodamas Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 299. n. 149 (1864) (Bogota; *nom. nud.*); id., *Reise Novara, Lep.* p. 45. n. 34. t. 10. fig. e. ♂ (1865) (Bogota;—Mus. Tring); Kirby, *l.c.* p. 524. n. 49 (1871) (N. Granada); Haase, *l.c.* i. p. 87 (1893).

Papilio metaphaon Butler, *Trans. Ent. Soc. Lond.* p. 434. n. 3 (1874) (Mexico; coll. Kaden, now in coll. Godman); Kirby, *Cat. Diurn. Lep.* p. 813. n. 376 (1877); Godm. & Salv., *Biol. Centr.*

Amer., Rhop. ii. p. 212. n. 37 (1890) (Mexico? ; Colombia) ; iid., *l.c.* p. 729. t. 111. p. 13. 14. ♂ (1901) (*type*).

Papilio phaon var. *immarginatus* Oberthür, *Et. d'Ent.* iv. p. 97. sub n. 298 (1880) (Mexico;—coll. Oberthür).

Papilio pharax Godman & Salv., *l.c.* p. 211. n. 36. t. 67. fig. 8. ♂ (1890) (Brit. Honduras;—coll. Godman) ; id., *l.c.* p. 729 (1901) (Mexico ; Coatepec).

♂ ♀. Markings (band or large patch) on disc of hindwing greenish or bluish grey.

Very variable, but not separable into more or less sharply defined forms. If specimens agreeing with the types of *ulopos*, *therodamas*, *metaphaon*, *phaon*, and *pharax* were treated under separate names as f. *ulopos*, f. *therodamas*, etc., a host of other names would have to be proposed for the numerous individual varieties which are not covered by those names. However, we do not think it necessary to deal with the present assemblage of individuals under more than one name.

The forewing bears usually a row of creamy or straw-coloured submarginal spots, the last ones being the largest ; sometimes there are, proximally of this row, some large discal patches, while in other individuals the forewing is practically devoid of markings. The hindwing has occasionally some small red dots distally of the discal band in specimens from Mexico and Honduras, such individuals occurring presumably in all the countries from Nicaragua to Mexico ; the discal band has either developed to a large central patch which enters the cell to a more or less great extent, or it is more band-like, standing distally of the cell. The name *pharax* is based on an individual from British Honduras in which the hindwing has the band situated outside the cell and bears a red anal spot ; *ulopos* (= *immarginatus*) was proposed for specimens which have only small or vestigial spots on the forewing, the band of the hindwing entering the cell ; Felder's individuals which he called *therodamas* have the spots on the forewing well marked, and the band of the hindwing placed distally of cell ; in the type of *phaon* there are submarginal spots on the forewing, but no discal patches, and the band of the hindwing just enters the cell ; in the type of *metaphaon* the central area of the hindwing is large, occupying a good part of the cell.

In a male in coll. Hewitson the spots on the breast and abdomen are buffish pink, not carmine red.

Hab. of *P. phaon* : Mexico to West Ecuador and Venezuela.

In the Tring Museum 42 ♂♂ of f. *phaon* from : Orizaba (Bilimek) ; Polochic, Guatemala ; San Pedro Sula, Honduras ; Rio Dagua, W. Colombia (Rosenberg) ; Bogota ; Tachira and Mocotoné, Venezuela (Briceño) ; Paramba, W. Ecuador.

126. *Papilio euryleon* Hew. (1855).

Papilio euryleon Hewitson, *Exot. Butt.* i. *Pap.* t. 2. fig. 6. ♂ (1855) (New Granada—Mus. Brit.) ; Felder, *Reise Novara, Lep.* p. 44. n. 33. t. 6. fig. 4. ♀ (1865) (Bogota).

♂. Spots of breast and abdomen red ; posterior segments of abdomen with red side-patches.—Forewing, *above*, with buffish grey area on disc behind cell, variable in extent and position, either reaching to hinder margin or being separate from it ; sometimes a patch in cell ; occasionally a row of submarginal spots.—Hindwing : a discal band of red spots, more or less continuous, either restricted to centre of wing or continued to abdominal margin, entering cell or separate from it, the band often reduced to two spots, occasionally pinkish grey ; a row of admarginal spots, upper one large, the others usually minute or vestigial, all grey or the

posterior ones reddish, these spots absent from one of our specimens of *P. curyleon clusoculis*.

Underside paler than upper; no distinct black cell-folds.—Forewing without red basal spots; either entirely greenish brown, with basal and posterior areas deeper in tint, or marked with one or two grey discal patches.—Hindwing: three red basal spots, but the one in cell usually absent or vestigial, the costal one being also often very small; discal band of spots much more restricted than above and pale pink in colour, sometimes vestigial or absent; a row of red submarginal spots, often vestigial; a row of grey admarginal dots as above.

♀. Forewing: a patch across cell and two patches R^2-M^1 on disc white.—Band of hindwing much broader than in male, not broken up into spots or incised distally on the veins, all red, or pinkish buff washed with red distally.—In *P. c. clusoculis* the female similar to male.

Scent-organ: basal third of vein SM^2 either densely covered with numerous greyish scales, which are smaller than the metallic scales situated before and behind this vein, or the scales on SM^2 also metallic and not reduced in size. The absence of the scent-organ in the subspecies inhabiting Eastern Ecuador is a very remarkable character. The length of the portion of SM^2 covered with scent-scales in the other subspecies is not constant.

Genitalia: ♂. Not essentially different from those of *P. harmonius* and *P. phaon*; apical lobe of harpe large, asymmetrically rounded; dorso-ventral ridge dentate only ventrally; central process at apex irregularly rounded and denticulate; ventral process individually variable in width and length, sometimes triangular, obtuse.

Early stages not known.

Hab. Costa Rica, southwards to Ecuador.

Five subspecies.

a. P. curyleon clusoculis Butl. (1872).

Papilio clusoculis Butler, *Cist. Ent.* i. p. 85 (1872) (Costa Rica); id., *Lep. Exot.* p. 163, t. 58, fig. 2. ♂ (1874); Kirby, *Cat. Lep. Rhop.* p. 812, n. 354 (1877); Butl. & Druce, *Proc. Zool. Soc. Lond.* p. 364, n. 368 (1874) (Costa Rica); Staud., *Exot. Tagf.* i. p. 19 (1884) (Chiriqui); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 209, n. 32 (1890) (Costa Rica; Panama).

♂. *Upperside*: patches of forewing purer grey than in the other subspecies; discal patches extending in extreme specimens from SM^2 forward beyond R^3 , while in the other extremes only one patch M^1-M^2 and a small streak before M^1 are present; cell with or without patch.—Hindwing: red band broad, always entering cell, last two spots sometimes vestigial only; spot SC^2-R^1 very variable, sometimes large, but usually small or absent; rarely a dot before SC^2 ; in one of our specimens a row of red submarginal spots confluent with the discal patches, no grey spots in this specimen.

Underside: forewing with two or three grey patches.

♀. Similar to male; on forewing a creamy patch R^3-M^1 , and a smaller one M^1-M^2 , no spot in cell; red patch of hindwing a little larger than in male.

Scent-organ present.

Hab. Costa Rica; Chiriqui.

In the Tring Museum 15 ♂♂ from: Carillo, Costa Rica, 3000 ft., October 1904 (A. Hall); Carillo, June—July 1903, and San José, Costa Rica (Underwood).

A female in coll. H. Grose-Smith.

b. P. euryleon pithonius subsp. nov. (Pl. VIII. fig. 55. 5S).

Papilio euryleon, Maassen & Weym., in Stübel, *Reisen S. Amer.*, *Lep.* p. 36. n. 34 (1890) (La Plata, Cauca, 1000 m.).

♂. *Upperside*: patch of forewing very much reduced (*type*), or as large as in the following subspecies.—Hindwing with three to five red spots which stand usually well away from cell, seldom touching it, rarely a dot in apex of cell.

Underside: red submarginal spots of hindwing minute or absent.

♀. Forewing: cell-patch anteriorly broader than in ♀ *P. e. euryleon*.—Hindwing: discal band narrower; red submarginal spots of *underside* smaller.

Scent-organ present.

Hab. Cauca valley, and Rio Dagua, West Colombia.

In the Tring Museum 14 ♂♂, 4 ♀♀, from: Cauca Valley; Rio Dagua (Rosenberg).

c. P. euryleon euryleon Hew. (1855) (Pl. V. fig. 23).

Papilio euryleon Hewitson, *l.c.* (New Granada); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 70. n. 283 (1856); Felder, *Wien. Ent. Mon.* v. p. 73. n. 4 (1860) (♀ descr.); id., *Verh. Zool. Bot. Ges. Wien* xiv. p. 299. n. 146 (1864) (Bogota); id., *Reise Novara, Lep.* p. 44. n. 33. t. 6. fig. 4. ♀ (1865) (Bogota); Kirby, *Cat. Diurn. Lep.* p. 524. n. 44 (1871) (New Granada); Oberth., *Et. d'Ent.* iv. p. 82. n. 269 (1880) (Carare, and from Bogota to Buenaventura, Colombia); Stand., *Exot. Taaf.* i. p. 19 (1884) (Colombia).

♂. Patch of forewing variable in extent, twice the size in some specimens as in others, mostly reaching from M^1 to inner margin, but the streak behind SM^2 often missing, there being on the other hand often a streak in front of M^1 .—The band of the hindwing consists usually of four spots standing closely around apex of cell, and two more or less distinct spots before abdominal margin, there being also a spot or some red scales in the apex of the cell in about half the specimens.

On the *underside* the forewing bears occasionally a vestigial patch M^1-M^2 . The discal spots of the hindwing are pale pink, spots R^3-M^2 are always present, spot R^2-R^3 is often vestigial, spot M^2-SM^1 standing proximally of red anal submarginal spot either present or absent; anal spot with or without white proximal border.

♀. Cell-patch of forewing more or less narrowed anteriorly; band of hindwing entering cell, red or pinkish buff.

Scent-organ present, but variable in extent.

Hab. Colombia: Magdalena valley and Cordillera of Bogota.

The male common in Bogota collections.

In the Tring Museum 84 ♂♂, 3 ♀♀, from: "Bogota"; El Lumbo, Cundinamarca, July 1903 (Mathan); Muzo, November and December 1896.

d. P. euryleon haenschii subsp. nov. (Plate VIII. fig. 54).

♂. *Upperside*.—Forewing: patches purer grey than in *P. e. euryleon*, different in shape and position, extending from M^1 to SM^2 , there being often a few white scales before M^1 and sometimes a streak behind SM^2 , the patch M^1-M^2 projecting beyond the second patch.—Hindwing: a small spot in apex of cell, seldom absent, and three to five spots around apex of cell, the last one being vestigial; a trace of a sixth spot at abdominal margin.

Underside.—Forewing: a large white patch M^1-M^2 , both the upper and under scales of the patch being white, or a portion of the upper scales brown, a greyish

patch M^2 — SM^2 corresponding to the patch of upperside; on this greyish patch the under scales are white, the upper layer being brown.—Hindwing: three pinkish discal spots, the first and second touching cell; often a trace of a fourth spot behind M^2 .

♀. *Upperside*.—Forewing: cell-patch not reaching across cell, being abbreviated anteriorly; patch R^3 — M^1 followed by a smaller patch shaded with black, and in one (of the three specimens seen) preceded by a small whitish spot.—Hindwing: a red band from R^1 to abdominal margin, entering cell, proximally whitish behind cell, more or less shaded with black towards abdominal margin, pink on underside.

Scent-organ present.

Hab. Western Ecuador.

In the Tring Museum 4 ♂♂ from: Balsapamba (R. Haensch), type; Paramba (W. Rosenberg).

4 ♂♂ and 3 ♀♀ in coll. Charles Oberthür from Balsapamba.

3 ♂♂ in the British Museum from the valley of Chimborazo and Porvenir.

e. P. euryleon anatmus subsp. nov. (Pl. VIII. fig. 53).

Papilio euryleon, Dognin, *Lép. Loja* p. 14 (1887); id., *l.c.* p. 37 (1891); Haensch, *Berl. Ent. Zeitschr.* xlviii. p. 153 (1903) (Sa. Inez, R. Pastaza, 1250 m.).

♂. *Upperside*.—Forewing: grey patch more speckled with black scales than in *P. e. euryleon*, on the whole larger, extending from inner margin beyond M^2 , touching cell, there being often a streak in cell proximally of origin of M^2 , streak in front of M^2 elongate-triangular, narrowing towards cell; some specimens with submarginal spots.—Hindwing: three red spots R^2 — M^1 on disc, well separated from cell, occasionally pinkish grey, the second the longest, first occasionally absent, sometimes the second alone distinct.

Underside: forewing without a trace of white patches.—Hindwing: discal spots R^2 — M^2 usually grey, rarely pinkish, usually a little nearer cell than distal margin, often vestigial; red submarginal spots R^3 — SM^1 distinct, last one (anal) without white border, or the border very thin.

♀ not known.

Scent-organ **absent**.

Hab. East Ecuador.

In the Tring Museum 85 ♂♂ from: Archidona (W. Goodfellow); Zamora (O. T. Baron), name-type; Loja.

127. *Papilio hipparchus* Staud. (1884).

Papilio hipparchus Staudinger, *Exot. Tagf.* i. p. 20. t. 13. ♂ (1884) (Cauca valley).

Not known to us. The hindwing is figured as having only one red spot at the base, but that may be an error of the colourist, the colouring of the figure not being quite correct according to Staudinger, *l.c.*

♂. Forewing black, with a row of grey submarginal spots.—Hindwing with pale pink distal band from R^1 to abdominal margin, the band absent (or vestigial?) on underside, except the last spot, submarginal and admarginal spots as in *P. euryleon*.

♀ not known.

Hab. Cauca valley, Colombia.

128. *Papilio harmodius* Doubl. (1846) (Pl. V. fig. 16. 19 ; Pl. VIII. fig. 52).

Papilio harmodius Doubleday, *Ann. Mag. N.H.* xviii. p. 374 (1846) (Bolivia); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 59. n. 272. t. 7. fig. 2 (1852) (Bolivia).

Sexes different ; female dimorphic, one form somewhat resembling the male, the other form quite different. Geographically variable.

♂. Dots on head, palps, collar and coxae buffish. Forewing semitransparent in apical half, the scales being reduced in size ; a white patch of variable size before inner margin, sometimes reduced to a narrow streak situated behind SM^2 , never reaching forward as far as R^3 , but occasionally extending across M^1 ; rarely a vestige of a band across cell.—Hindwing : a row of red spots on disc, variable in size and number ; a row of white arched submarginal spots, which are vestigial or absent in most specimens.

Underside much paler than upper, cell of both wings with black folds.—Forewing with a red costal spot.—Hindwing with three red spots at base, the one in cell being small and often vestigial or even absent ; discal spots more or less pinkish white proximally.

♀₁. Forewing with white band across cell continuous with two large discal patches R^2-M^1 ; spots of hindwing white or yellowish, or red centred with white.

♀₂. Forewing with trace of the white markings of female ; spots of hindwing red.

Scent-organ : numerous greyish scales on SM^2 of hindwing, these scales much smaller than the scales situated before and behind this vein.

Genitalia : ♂. Distal lobe of harpe large, rounded, proximal angle of ventral dentate edge not produced.—♀ not dissected.

Early stages not known.

Hab. Colombia to Bolivia.

The coloration of the first kind of female agrees with that of the females of *P. erlaces*, the Ecuador females of both insects being white-banded on the hindwing, the females from Northern Peru yellowish-banded, and the females from Southern Peru and Bolivia red-banded.

a. *P. harmodius isus* Oberth. (1880).

Papilio xeniades var. *isus* Oberthür, *Et. d'Ent.* iv. p. 81. sub n. 268 (1880) (Colombia).

Papilio aristogiton Staudinger, *Exot. Tagf.* i. p. 19. t. 13 (1884) (Cauca).

♂. Forewing : white patch large, reaching from hinder margin to M^2 or beyond, being large also on the *underside*.—Hindwing : a band of six or seven red spots which are paler in the centre than at the edges, being occasionally pinkish white edged with red ; white submarginal bars usually absent.

♀ not known.

Hab. Cauca valley, Colombia.

5 ♂♂ in coll. Oberthür, and 1 ♂ in coll. Godman.

b. *P. harmodius halex* subsp. nov. (Pl. VIII. fig. 52).

Papilio xeniades, Maassen & Weym. (*non* Hewitson, 1868, *err. det.*), in Stübel, *Reisen S. Amer., Lep.* p. 24. n. 103 (1890) (Villavicencio).

♂. Forewing as in the preceding.—Hindwing above with five red spots which are not paler in centre, the upper two spots vestigial or minute.

♀. *Upperside*.—Forewing with white patch from R^3 beyond M^2 , just entering cell.—Hindwing with five pinkish red spots ; tooth R^3 prominent.

Hab. "Bogota," Colombia.

In the Tring Museum 5 ♂♂ from "Bogota."

A female in coll. Adams from "Colombia."

c. P. harmodius xeniades Hew. (1868).

Papilio xeniades Hewitson, *Trans. Ent. Soc. Lond.* (3). v. p. 561. n. 1 (1868) (Ecuador); ♂ & "♀"; this "♀" is ♂; id., *Exot. Butt.* iv. *Pap.* t. 9. fig. 26 (1868); Kirby, *Cat. Diurn. Lep.* p. 524. n. 45 (1871) (Ecuador); Oberthür, *Et. d'Ent.* iv. p. 81. n. 268 (1880) (Ecuador); Kirby, *Trans. Ent. Soc. Lond.* p. 353 (1881) (Rio Topo, Ecuador; "hardly distinct from *gayi* Luc."); Staud., *Exot. Tagf.* i. p. 20 (1884).

Papilio harmodius, Kirby, *l.c.* p. 524. n. 44 (1871) (*partim*; Ecuador); Hopff., *Stett. Ent. Zeit.* xl. p. 52. n. 16 (1879) (*partim*; Ecuador); Staud., *Exot. Tagf.* i. p. 19 (1884) (*partim*; Ecuador); Dogn., *Lép. Loja* p. 15 (1887); id., *l.c.* p. 37 (1891).

♂. White patch of forewing very variable in size, often reduced to a streak situated at inner margin, in other specimens the patch being extended beyond M^2 , in most individuals excised in front or obliquely truncate, its distal edge extending beyond M^2 , while proximally the patch does not reach M^2 ; on *underside* the patch always small.—Hindwing: three to five red spots, variable in size, occasionally centred with pinkish white, being on underside pinkish white edged with red distally; white submarginal bars more often absent than present; white marginal spots very variable in size; tooth R^3 in some specimens more prominent than in others.

♀. Dichromatic:

*a*¹. ♀-f. *androna* nov. (Pl. V. fig. 19).—Forewing with some grey scales on disc between lower angle of cell and M^2 and in cell.—Hindwing: a row of five red spots, spot R^3 — M^1 the longest, almost three times as long as broad, uppermost spot small; the spots pink-white on underside, slightly edged with red distally.—One specimen in the Tring Museum from Zamora (O. T. Baron).

*a*². ♀-f. *virginia* Kirby (1881).

Papilio virginia Kirby, *Trans. Ent. Soc. Lond.* p. 352 (1881) (Rio Copataza, affluent of Rio Pastaza; "allied to *P. lacydes*"!); Grose-Smith & Kirby, *Rhop. Exot.* ii. *Pap.* t. 16. fig. 3. 4 (1897) (fig. of type).—Resembling the female of *P. lacydes*. In coll. Oberthür from Ambato; in coll. Grose-Smith from the Rio Copataza; in Mus. Tring from the neighbourhood of Zamora.

Forewing: a large patch across apex of cell, two large patches R^2 — M^1 and a streak behind M^1 white.—Hindwing: a complete band of white patches, some of them slightly edged with red both above and below.

Hab. of *P. harm. xeniades*: West coast of Colombia (Rio Dagua), and Ecuador; apparently common in Eastern Ecuador.

The females from West Ecuador and West Colombia may possibly be different from the East Ecuadorian females. The long series of males in coll. Oberthür from Honda, Pacific slope of Colombia, agree on the whole with the specimens from Eastern Ecuador, but the range of variation is somewhat different. One of the Honda individuals has a vestigial band across the cell.

In the Tring Museum 120 ♂♂, 3 ♀♀, from: Zamora (O. T. Baron); Ambato; Santa Inez (R. Haensch); Archidona (W. Goodfellow).

d. P. harmodius imaus subsp. nov. (Pl. V. fig. 16).

Papilio harmodius, Hopffer, *Stett. Ent. Zeit.* xl. p. 52. n. 16 (1879) (*partim*; Peru); Staud., *Exot. Tagf.* i. p. 19 (1884) (*partim*; Peru).

Papilio xeniades var. *harmodius*, Oberthür, *Et. d'Ent.* iv. p. 81. sub n. 268 (1880) (Peru).

♂. Like the following; white patch of *underside* of forewing often reduced, in most specimens a white streak behind SM^2 .

♀. Forewing similar to that of *xeniades* ♀-f. *virginia*, but the cell-patch costally more or less reduced, and the upper discal patch smaller than in ♀-f. *virginia*.—Band of hindwing yellowish buff on upperside, almost white on underside, spots R²—M² long, spot R³—M¹ being nearly four times as long as broad, extending close to cell, last (double) spot and one or two of the others somewhat edged with red both on upper and under surface.

Hab. North-East and East Central Peru; *type*: ♀ from Cusli.

In the Tring Museum 27 ♂♂, 3 ♀♀, from: Pozuzo (W. Hoffmanns); Cusli, Huánuco, 1800 m. (W. Hoffmanns); R. Chuchuras, affl. of R. Palcazu, 320 m. (Hoffmanns); Huayabamba R., S.E. of Chachapoyas, 3500 ft. (O. T. Baron).

c. P. harmodius harmodius Doubl. (1846).

Papilio harmodius Doubleday, *l.c.* (1846) (Bolivia); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 19. n. 223 (1846) (Bolivia); Doubl., *List Lep. Ins. Brit. Mus.* i. App. p. 3 (1848) (Bolivia); Gray, *Cat. Lep. Ins. Brit. Mus.* i. Pap. p. 59. n. 272. t. 7. fig. 2. ♂ (1852) (Bolivia); id., *List Lep. Ins. Brit. Mus.* i. Pap. p. 71. n. 288 (1856) (Bolivia); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 299. n. 145 (1864) (Bolivia; "Ecuador" loci error, teste specim. in coll. Felder); Kirby, *Cat. Diurn. Lep.* p. 524. n. 43 (1871) (*partim*; Bolivia); Hopff, *Stett. Ent. Zeit.* xl. p. 52. n. 16 (1879) (*partim*; Bolivia); Stand., *Exot. Tagf.* i. p. 19 (1884) (*partim*; Bolivia); Haase, *Untersuch. Mimicry* i. p. 86 (1893); Weeks, *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumani).

♂. Forewing always with a large patch M¹—SM², consisting of two large spots, both above and below, there being in most specimens a small white streak behind SM², and occasionally another streak in front of M¹; the white spots often larger on underside than on upper.—Hindwing with five red spots, the second being the smallest, the third and fourth occasionally pale in centre, all the spots more or less extended pinkish white on the underside of the wing; often a series of white submarginal bars present, the bars being usually more distinct above than below.

♀. Forewing: white cell-patch not reaching across cell; white discal area consisting of three patches R²—M², the upper patch small, the third as long as the middle one.—Spots of hindwing larger than in male, red, spots R²—M¹ being whitish in centre; marginal tooth R³ obtuse, not longer than tooth R².

Hab. Bolivia and South-East Peru; the only female seen being in coll. Charles Oberthür, from Cochabamba.

A common insect.

In the Tring Museum 66 ♂♂ from various places, from Chanchamayo to the Mapiri River.

129. *Papilio trapeza* spec. nov. (Pl. V. fig. 15).

♂. Body as in *P. harmodius xeniades*, but the hairs of the frons shorter.

Wings, *upperside*.—Forewing proportionally narrower than in *P. harmodius*, the hinder margin being shorter; a creamy, faintly greenish, patch, from hinder margin towards M², which it does not reach, the second partition of this patch broader and longer than in *P. harmodius xeniades*, reaching proximally to vein SM³.—Hindwing more triangular than in *P. harmodius*, more acutely dentate, vein R² somewhat shorter than cell, while in *P. harmodius* this vein is as long as, or longer than, cell; white fringe-spots thinner; three red spots from R³ to abdominal margin, the first shaded over with black, the second elliptical, in one of the specimens examined also shaded with black, the third spot much the largest, being the same length as the second, but twice the width.

Underside.—Forewing: patch creamy white, smaller than above, but the streak along hinder margin broader and longer than in any form of *P. harmodius*, the upper patch not reaching beyond the fold (SM^1).—Hindwing with four red spots on disc, there being here an additional spot R^2-R^3 , which is not present on the upperside; first and fourth spots small, second the largest, about twice as long as broad, white proximally or in centre, or white with red distal border; third spot one-third shorter than second, with trace of white proximally or in centre, or similarly coloured as second spot; three white curved submarginal bars R^2-M^2 , which are not present above.

Scent-organ: vein SM^2 densely covered with greyish brown scales as in *P. harmodius*, but these scales rather broader than in that species.

Genitalia as in *P. harmodius*, the central process of the harpe being a little broader than in most specimens of *P. harmodius* which we have examined.

Hab. East Ecuador.

In the Tring Museum 2 ♂♂ from: Rio Napo (R. Haensch), *type*; Rio Curarai (Simson).

In coll. F. D. Godman 3 ♂♂ from: Santa Inez and Agnamo. In coll. Oberthür from Sarayaçu (Buckley).

This insect cannot easily be confounded with *P. harmodius xeniades* from the same district, the shape and markings of the hindwing and the different development of the patch of the forewing distinguishing *P. trapeza* at a glance.

In coll. H. Grose-Smith there is a male from "Ecuador" which is doubtless an individual of the present species, though it differs from the specimens described above in several points, the most remarkable difference being the total absence of a patch from the upper and underside of the forewing. The hindwing bears on the upperside three distinct red spots besides the vestige of a fourth, there being on the underside four distinct spots and a vestigial fifth. The white submarginal spots of the hindwing described above are absent. This specimen may be a geographical form or an individual aberration of *P. trapeza*.

130. *Papilio xynias* Hew. (1875).

Papilio xynias Hewitson, *Ent. Mo. Mag.* xii. p. 153 (1875) (Bolivia); id., *Ecol. Butt. v. Pap.* t. 15. fig. 48. ♂ (1877); Kirby, *Cat. Diurn. Lep.* p. 814 (1877) (Bolivia); Haase, *Untersuch. Mimicry* i. p. 86 (1893) ("N. Granada" error loci); id., *l.c.* ii. p. 69. t. 9. fig. 66 (1893).

♂. Allied to *P. harmodius*; hairs of frons as short as in *P. trapeza*.—Wings, *upperside*: scaling of forewing non-dentate or feebly dentate; a pale green patch from M^2 to inner margin, variable in length, apparently never extending beyond M^2 , always touching hindmargin, the scales entire, while in *P. harmodius* and *P. trapeza* the scales of the patch are dentate.—Hindwing: acutely dentate, tooth R^3 developed to a more or less distinct tail; three red spots R^3-SM^2 , the last large, often reaching halfway down to base, the first and second elongate, occasionally reduced, rarely absent; scales of these spots entire or a few of them slightly dentate; three to five white admarginal bars.

Underside much paler than upper; cell-fold and red basal spots as in *P. harmodius*.—Forewing: patch of forewing paler and rather smaller than above, but very distinct.—Hindwing: four red spots, the second and third longer than broad, more or less pinkish white proximally, the last one double, about half the

length of the third, which is longer than the second; white submarginal bars rather larger than above; cell a little longer than vein R².

♀ not known.

Scent-organ: no modified scales on SM² of hindwing, the scales upon this vein being the same size and colour as those in front of and behind the vein, *P. xynius* differing in this respect remarkably from all its allies.

Early stages not known.

Hab. Bolivia and Pern, eastern slopes.

In the Tring Museum 15 ♂♂ from: Pozuzo, Huáncco, 800—1000 m. (W. Hoffmanns); Chanchamayo (Schnuke); La Union, R. Huacamayo, Carabaya, 2000 ft., December 1904, wet season (G. Ockenden); Mapiri, Bolivia.

In coll. Oberthür from Hillapani, Tarapoto and Chanchamayo.

131. *Papilio ariarathes* Esper (1788) (Pl. V. fig. 17, VIII. fig. 57).

Papilio Eques Trojonus ariarathes Esper, *Ausl. Schmett.* p. 57. n. 24. t. 14. fig. 2. ♀ (1788) (S. Amer.; "var." fig. 3 alia species).

Papilio ariarathes, Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 336 (1861) (variability); id., *Journ. Entom.* i. p. 224. n. 8 (1862) (geogr. variability; *eyamon*, *gaji*, *evagorus* are local vars.); Kirby, *Cat. Diurn. Lep.* p. 523. n. 35 (1871).

♂♀. Buffish grey dots on occiput, pronotum, palpus and coxae. Spination of legs rather heavy. Wings, *beneath*, with two red spots at base of forewing, one in cell and the other before it, and three basal spots on hindwing, the second situated in cell being often vestigial or absent.

Very variable in both sexes; forewing of male with a whitish or buffish band or patch on upperside extending from inner margin forward, being seldom vestigial, —Hindwing of male with a discal series of red patches in most specimens, sometimes only one or two distinct patches present on upperside, situated near abdominal margin; cell rather narrower in middle than in the allied species.

In the female the forewing has usually one or more white patches on disc and often a small patch in cell, but is sometimes all black.—A red discal band on hindwing, variable in width, often entering cell.

Scent-organ: basal third of vein SM² densely covered with small greyish scales.

Genitalia: ♂. Apical lobe of harpe short; ventral lobe of dorso-ventral ridge slightly curved upwards in a view from the base of the clasper, obliquely rounded; central process spatulate, dentate, usually rounded at apex, but sometimes obliquely truncate.

Early stages not known.

Hab. Colombia to Bolivia, and eastwards to the Guianas, Pará, and the Brazilian province of Goyaz.

With the exception of the form from Goyaz, the subspecies do not appear to be sharply defined. In the case of species individually so variable as *P. ariarathes* it requires a large material from many districts to obtain a correct view of the geographical variation. The material of *P. ariarathes* which we have seen in various collections is not quite sufficient for this purpose. Therefore we are not sure that our division of *P. ariarathes* into six subspecies is quite true to nature. The species varies in different localities according to the models mimicked, the females from different districts being generally more obviously different than the males.

a. *P. ariarathes ariarathes* Esper (1788).

Papilio Eques Trojannus ariarathes Esper, *l.c.* ♀ (1788).

Papilio ilus, Godart (*non* Fabr., 1793, err. det.), *Enc. Méth.* ix. p. 33. n. 21 (1819) (syn. excl.; ♂, "America"); Boisduval, *Spec. Gén. Léop.* i. p. 280. n. 104 (1836) ("America"); Oberth., *Et. d'Ent.* iv. p. 81. p. 264 (1880) (*partim*; Cayenne).

Papilio ariarathes, Boisduval, *Spec. Gén. Léop.* i. p. 287. n. 14 (1836) (Surinam; ♀); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 18. n. 207 (1846) (Guiana); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 61. n. 275 (1852) (descr. of ♂; "N. Granada?" error); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 298. n. 136 (1864) (*partim*); Kirby, *Cat. Diurn. Lep.* p. 523. n. 35 (1871).

Papilio aeces Boisduval, *l.c.* p. 288. sub n. 14 (1836) (nom. maxime superfluum).

♂. Forewing: a rather narrow patch from inner margin to M^2 , nearly as large below as above.—Hindwing: four to six red spots, separated from one another, distant from cell.

♀. Forewing with white patches, or these patches vestigial. Five or six red spots on hindwing, spots R^2-M^2 being long, touching cell or nearly.

a'. ♀-f. *ariarathes* Esp., *l.c.*—Forewing with one to three white patches on disc and often a narrow patch posteriorly in cell.

b'. ♀-f. *eumela* nov.—White markings of forewing vestigial (name-type from Surinam).

Hab. French and Dutch Guiana.

In the Tring Museum 4 ♀♀ from Surinam.

b. *P. ariarathes menes* subsp. nov. (Plate VIII. fig. 57).

Papilio ariarathes, Erichson, in Schomb., *F. F. Brit. Guiana* p. 593 (1848) (descr. of ♂); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 336 (1861) (*partim*); Brit. Guiana.

♂. Forewing, *above*, with band from inner margin to M^1 or M^2 , the posterior spot often much reduced, patch M^2-SM^2 sometimes alone distinct, 4 to 6 mm. wide; this patch always present on underside, where it is a little smaller than above. the spot behind SM^2 and the one before M^2 also present below in the specimens which have them clearly marked on the upperside.—Hindwing rather strongly dentate, tooth R^3 prominent; three or four red spots on upperside, standing about halfway between cell and distal margin; five, seldom four, spots on underside, spot R^3-M^1 being pale proximally.

♀. Forewing with a large patch R^3-M^1 , a smaller one M^1-M^2 , often reduced to a streak, a vestigial spot in cell and occasionally another vestigial one before R^3 (*type*).—Hindwing: five or six red spots, all well separate from cell, spots R^3-M^2 longer than the others.

Hab. British Guiana; *type*: ♀.

In the Tring Museum 5 ♂♂, 5 ♀♀, from: Christianburg, R. Demerara; Bartica, 26. February 1904 (R. Haensch); Upper Real Berbice R.

c. *P. ariarathes evagoras* Gray (1852).

Papilio ilus, Doubleday (*non* Fabr., 1793, err. det.), *List Lep. Ins. Brit. Mus.* i. *App.* p. 3 (1848) (*partim*; Venezuela); Oberth., *Et. d'Ent.* iv. p. 81. n. 264 (1880) (*partim*; Pará).

Papilio evagoras Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 61. n. 276. t. 9. fig. 3. ♂, 4. ♀ (1852) (Venezuela); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 72. n. 292 (1856); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 298. n. 132 (1864) (*partim*; Venezuela); Oberth., *Et. d'Ent.* iv. p. 81. n. 265 (1880) (Caracas); Staud., *Exot. Tagf.* i. p. 13 (1884) (Venezuela); Haase, *Untersuch. Mimicry* i. p. 97 (1893) ("New Granada" errore).

Papilio ariarathes local var. *evagoras*, Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 336 (1861) (*partim*; Venezuela).

Papilio ariarathes var. *P. evagoras*, Kirby, *Cat. Diurn. Lep.* p. 523. sub n. 35 (1871).

♂. Forewing : a narrow band, extending from inner margin to M^1 or beyond, situate halfway between cell and distal margin at R^3 and M^1 or nearer the cell ; the band represented on *underside* by two or three clearly marked spots.—Hindwing : four or five red spots, spots R^2 — M^2 close to cell as a rule, spot R^1 — R^2 less distant from cell than in the other forms, especially on *underside*, the band therefore appearing more curved ; spots R^2 — M^2 pinkish white beneath with red distal border, sometimes partly buffish white on *upperside*.

♀. Three white or buffish discal patches on forewing and a rather large cell-patch.—Hindwing : six large patches around cell (sometimes buffish) and apical half or two-fifths of cell red ; abdominal margin at least partly red.

Hab. Venezuela, from Caracas to the Orinoco.

In the Triug Museum 5 ♂♂, 1 ♀, from : "Venezuela" (Moritz) ; Porto Cabello ; Caicara, Orinoco, 1898 (Cherrie) ; Ciudad Bolivar, 5. September 1898 (S. M. Klages).

d. P. ariarathes metagenes subsp. nov.

Papilio ariarathes, Wallace, *Trans. Ent. Soc. Lond.* (2). ii. p. 256 (1854) (Pará) ; Bates, *l.c.* (1851) (*partim* ; Pará) ; Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 298. n. 136 (1864) (*partim* ; Pará).

Papilio cyamon, Haase (*non* Gray, 1852, *err. det.*), *Untersuch. Mimicry* i. p. 87. ♂. t. 10. fig. 71. ♀ (1893) (Pará).

♂. Forewing : usually with a band from hinder margin beyond R^3 , gradually disappearing, vestigial on *underside*.—Hindwing : four or five red spots, separate from cell, upper one or two small, spots R^3 — M^2 elongate, longer on upper than *underside* ; tooth R^3 prominent.

♀. Forewing : a white band along hinder side of cell consisting of two large patches R^3 — M^2 , a smaller patch R^2 — R^3 , and a fourth (much variable in size) behind M^2 , the white scaling sometimes nearly reaching inner margin of wing ; cell with or without white streak.—Hindwing : six red spots, R^2 — M^2 touching cell, at least on *upperside*.

Hab. Pará.

The female resembles the females of some Aristolochia-Swallowtails (*P. anchiscs thelios*, *P. aglaope*).

Name-type in coll. Oberthür.

e. P. ariarathes gayi Lucas (1852).

Papilio gayi Lucas, *Rev. Zool.* p. 193 (1852) (Cuzco, Peru) ; Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 60. n. 273 (1852) ; *id.*, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 71. n. 289 (1856) ; Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 298. n. 134 (1864) (Cuzco ; Ega) ; Hopff., *Stett. Ent. Zeit.* xl. p. 51. n. 11 (1879) (Peru) ; Stand., *Ecot. Tagf.* i. p. 13 (1884).

Papilio cyamon Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 60. n. 274. t. 7. fig. 1. ♂, t. 11. fig. 3. ♀ (1852) (Ega, ♂ ; ♀ hab. ? ; var. ♂ "Brazil") ; *id.*, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 71. n. 290 (1856) (Ega ; Villa Nova ; Rio Negro) ; Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 256 (1854) (Upper Amazons ; forest) ; Felder, *l.c.* p. 298. n. 135 (1864) (Ega ; Villa Nova ; Rio Negro) ; Hopff., *l.c.* p. 51. n. 15 (1879) (Brazil, Peru) ; Staud., *l.c.* p. 13 (1884) (distinct species ; Amazons).

Papilio evagoras Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 62. sub n. 277 (1852) (*partim* ; ♂, Burra) ; Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 256 (1854) (Upper Amazons ; forest) ; Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 298. n. 132 (1864) (*partim* ; Ega ; R. Negro).

Papilio ariarathes local var. *cyamon*, Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 336 (1861) (Upper Amazons).

Papilio ariarathes local var. *gayi*, *id.*, *l.c.* (1861) (Ega).

Papilio ariarathes local var. *evagoras*, *id.*, *l.c.* p. 337 (1861) (Ega).

Papilio aristagoras Felder, *l.c.* p. 298. n. 133 (1864) (Bogota) ; *id.*, *Reise Navarra, Lep.* p. 41. n. 30. t. 4. fig. e. ♂ ab., f. ♀ (1865) (Bogota).

- Papilio ariarathes* var. *P. cyamon*, Kirby, *Cat. Diurn. Lep.* p. 523. sub n. 35 (1871).
Papilio ariarathes var. *P. gayi*, id., l.c.
Papilio ariarathes var. *P. aristagoras*, id., l.c.
Papilio ilus, Oberthür (non Fabr., 1793, err. det.), *Et. d'Ent.* iv. p. 81. n. 264 (1880) (*partim* ; Obydos ; variability of "ilus").
Papilio charoba Kirby, *Trans. Ent. Soc. Lond.* p. 352 (1881) (R. Pastazza).
Papilio arianus Staudinger, *Exot. Tuff.* i. p. 12 (1884) (Amazons : R. Maués to R. Huallaga ; Esper's fig. of *ariarathes* erroneously consid. ♂) ; Michael, *Iris* vii. p. 213 (1894) (Sao Paulo de Olivença).
Papilio ariarathes, Staudinger, l.c. t. 8. ♂ (1884).

♂ ♀. There are three principal individual forms, connected by intergradations. Most specimens of the male have no sharply marked white spots on the underside of the forewing or only small spots.

a'. *P. a. gayi* f. *anargus* nov. ; *P. a.* var. *cyamon* ♀, Bates (non Gray, err. det.), l.c.—Forewing without white band or patches ; in male a few grey scales indicating the band ; hindwing of female with a vestige of a red dot in apex of cell.—Middle and Upper Amazons ; name-type : ♀, from Iquitos.

b'. *P. a. gayi* f. *cyamon* Gray, l.c. ; *P. charoba* Kirby, l.c.—♂. Similar to male of *P. a. evagoras* ; forewing with a band which is on the whole a little more distal than in *evagoras*.—Hindwing : four or five red spots, middle ones either reaching cell or separate from it.—♀. With narrow vestigial band on forewing ; hindwing with red cell-spot ; sometimes nearly all the spots of the hindwing creamy.

Middle and Upper Amazons ; Ecuador ; Peru ; Bolivia.

c'. *P. a. gayi* f. *gayi* Lucas l.c. ; *P. aristagoras* Feld., l.c. ; *P. arianus* Staud., l.c. ; *P. cyamon* Gray, l.c. , ♀ non ♂.—♂. Forewing : a large buffish patch before inner margin ; seldom white, varying much in size, sometimes not reaching M², in other specimens externally produced forwards, this projection corresponding to the band of the next form (♂-f. *cyamon*).—Hindwing : two to five red spots (occasionally creamy), sometimes only the last spot distinct, spots variable in size, sometimes approaching cell.—♀. Forewing : one or two large white patches on disc, usually a small third spot and often a cell-spot.—Hindwing mostly with cell-spot.—Middle and Upper Amazons ; Colombia ; Peru ; Bolivia.

Hab. of *P. a. gayi* : Middle Amazons to Colombia and southward to Bolivia.

In the Tring Museum 48 ♂♂, 5 ♀♀, from : Bogota ; Archidona and Coca, E. Ecuador (W. Goodfellow) ; Aguamo, R. Napo (R. Haensch) ; Manáos ; Juhuty, April 1905 (Mathan) ; Yurimaguas ; Thomar ; Iquitos ; Sao Paulo de Olivença ; R. Cachyaco, affl. of R. Huallaga (Stuart) ; Chanchamayo (Schunke) ; La Merced (Watkins) ; Reyes, August 1895 (Stuart) ; Prov. Sara, S. Cruz de la Sierra, February 1904 (J. Steinbach).

f. *P. ariarathes leuctra* subsp. nov. (Pl. V. fig. 17).

♂. Forewing : a pure white patch from inner margin beyond M¹, of almost even width, 6 mm. broad behind M¹, hardly narrower below than above, the spot behind SM² sometimes absent.—Hindwing : a band of six long red spots, the last double, spots R²—M² touching cell, some grey and red scales between C and SC² representing a seventh spot ; in one of the specimens some grey scales in apex of cell on underside of hindwing.

Hab. Goyaz, Brazil.

4 ♂♂ in coll. Charles Oberthür ; also in the Hope collection, Oxford, collected by Burchell.

132. *Papilio ilus* Fabr. (1793) (Pl. VIII. fig. 50).

- Papilio Eques Tros ilus* Fabricius, *Ent. Syst.* iii. 1. p. 17. n. 51 (1793) (Amer., "Jon. fig. pict. i. tab. 29").
- Papilio ilus*, Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 59. n. 271 (1852) (synon. *partim*); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 71. n. 287 (1856) (synon. *partim*); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 335 (1861); id., *Journ. Entom.* i. p. 224. sub n. 8 (1862) (prob. = *hostilius* Feld.); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 299. n. 143 (1864); Butl., *Cat. Diurn. Lep. descr. Fabr.* p. 238. n. 16 (1869); Kirby, *Cat. Diurn. Lep.* p. 523. n. 41 (1871); Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 126. n. 240 (1880) (Sta. Marta); iid., *Biol. Centr. Amer., Rhop.* ii. p. 208. n. 30 (1890) (♂ ♀, Panama; Colombia; Venezuela; = *hostilius*).
- Papilio hostilius* Felder, *Wien. Ent. Monatschr.* v. p. 73. n. 5 (1861) (Prov. Mérida); id., *Verh. Zool. Bot. Ges. Wien*, xiv. p. 299. n. 144 (1864) (Caracas); id., *Reise Noctura, Lep.* p. 43. n. 32. t. 9. fig. a (1865) (Venezuela, coll. Kaden;—type now in coll. Godman); Kirby, *Cat. Diurn. Lep.* p. 523. n. 42 (1871).
- Papilio guaco* Staudinger, *Verh. Zool. Bot. Ges. Wien* xxv. p. 91. n. 1. (1876) (Chiriqui); id., *Erot. Tagf.* i. p. 13 (1884) (Chiriqui); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 209. n. 31. t. 67. fig. 1. ♂ (1890) (Chiriqui).

Judging from a small series of specimens of this apparently rare insect—rare in collections at least—we come to the conclusion that the differences between the types of *ilus* (Jones's figure), *hostilius* and *guaco* are individual, not specific or geographical.

♂ ♀. Close to *P. branchus*, of which it is perhaps a southern form, the patches of the forewing being, however, in a different position. Forewing with or without buffish white spot in cell; two or three patches of the same colour behind cell, patch M²—SM² being the largest; distal margin with small white spots, except at apex.—Hindwing: a row of red spots from R² or R³ to abdominal edge, the spots variable in size, separate from cell or close to it, larger in female than in male.

Underside: forewing black-brown, patch M²—SM² vestigial or distinct, but always smaller than above. Hindwing with four basal spots as in *P. belesis* and *branchus*; discal spots much paler than above, being more or less whitish pink, at least proximally.

Early stages not known.

Hab. Northern Venezuela; Colombia: Sta. Marta and Valdivia; Panama: Lion Hill and Chiriqui.

In the British Museum, coll. Godman, and coll. Grose-Smith.

133. *Papilio branchus* Doubl. (1846).

Papilio branchus Doubleday, *Ann. Mag. N. H.* xviii. p. 373 (1846) (Honduras).

♂ ♀. Some spots on occiput and collar red; frons usually black, often with two red vittae; a white dot laterally on forecoxa, a pink or red dot each on meso- and metasternite and at base of first abdominal segment. Palpi usually with white dot or dots. Wings black, opaque, paler below than above.—Forewing with white patch situated on disc and in cell, separated into two, three, or four spots by the black veins, or this patch absent; fringe white between veins, but these spots often very small, usually absent from apex of wing.—Hindwing: a broad band of six, seldom seven red spots; spots R²—M² long, situated near cell.

Underside: white patch of forewing usually a little larger than above, no red spot at base.—Hindwing: four red spots at base, the posterior one continuous, with a line situated on abdominal fold; red discal spots much paler than above, pinkish white, shading into red distally.

Genitalia: ♂. Apical lobe of harpe slightly triangular, rounded off; dentate ridge rather strongly elevate ventrally and heavily dentate.

Early stages not known.

There are two individual forms:

a'. P. branchus f. branchus Doubl. (1846).

Papilio branchus Doubleday, *l.c.* (Honduras); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 19. n. 217 (1846); Doubl., *List Lep. Ins. Brit. Mus.* i. *Append.* p. 3 (1848); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 62. n. 277. t. 7. fig. 3. ♀ (1852) (Honduras; Guatemala); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 72. n. 293 (1856); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 146 (1863); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 298. n. 137 (1864) (Honduras; Guatemala; Mexico); Boisdu., *Consid. Léop. Guatem.* p. 7 (1870) (Honduras; Mexico; = *hephaestion* errore); Kirby, *Cat. Diurn. Lep.* p. 523. n. 36 (1871) (Amer. centr.; Mexico); Butl. & Druce, *Proc. Zool. Soc. Lond.* p. 364. n. 369 (1874) (Costa Rica); Oberth., *Et. d'Ent.* iv. p. 81. n. 266 (1880) (Honduras); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 207. n. 26. t. 67. fig. 7. genit. (1890) (Mexico; Cordova, Omealca, Atoyac, Oaxaca; Guatemala; Honduras; Nicaragua; Costa Rica).

♂ ♀. Forewing with white central patch. This patch variable in size. It consists in the male of a large cell-spot, a large spot R^3-M^1 , and a minute spot R^2-R^3 , there being occasionally also a spot M^1-M^2 ; spot R^2-R^3 rarely absent. In the female, spot R^2-R^3 much larger than in the male.

This form occurs from Vera Cruz in Mexico to Costa Rica.

b'. P. branchus f. belephantus Godm. & Salv.

Papilio belephantus Godman & Salv., *l.c.* p. 208. n. 29. t. 67. fig. 6. ♂ (1890) (Mexico; Atoyac; Guatemala; Honduras).

♂. Forewing without white patch.

This form is much rarer than the preceding one. It has apparently the same distribution, but is so far known only from Southern Mexico, Guatemala, and Honduras.

Hab. of *P. branchus*: Mexico to Costa Rica.

In the Tring Museum 26 ♂♂ and 2 ♀♀ of *f. branchus* from: Cordoba, Vera Cruz, 2800 ft., July 1904 (A. Hall); Songolica, June 1899 (W. Schaus); Mazatenanga, W. Guatemala, 1000 ft., September 1904 (A. Hall); Guatemala, San Pedro Sula, Honduras; Cartago and Guatil Piris, Costa Rica (Underwood).—1 ♂ of *f. belephantus*, no locality.

134. *Papilio belesis* Bates (1864).

Papilio belesis Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 74. n. 300 (1856) (Mexico; *nom. nud.*); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 146 (1863) (Mexico; *nom. nud.*); Bates, *Ent. Mo. Mag.* i. p. 1. n. 1 (1864) (Guatemala).

♂ ♀. Close to *P. branchus*. Forewing usually quite black, but sometimes with one or two white spots on disc; fringe-spots nearly always distinct, except at apex of wing, rarely vestigial.—Hindwing variable in length; a row of six or seven red spots, situated parallel to distal margin and nearer to the margin than to the cell; the middle spots not so much larger than the others as in *P. branchus*; size of the spots very variable.

Genitalia: ♂. Apical lobe of harpe shorter and more evenly rounded than in *P. branchus*, dentate ridge more narrowly elevate ventrally, dentition less heavy.

Early stages not known.

Two individual forms:

a. P. belesis f. hephaestion Feld. (1865).

Papilio hephaestion Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 298. n. 139 (1864) (Mexico; *nom. nud.*); id., *Reise Novara, Lep.* p. 42. n. 31. t. 6. fig. b (1865) (Mexico—Mus. Tring); Kirby, *Cat. Diurn. Lep.* p. 523. n. 38 (1871) (Mexico); Oberth., *Et. d'Ent.* iv. p. 81. n. 267 (1880) (Mexico); Godm. & Salv., *Biol. Cent. Amer., Rhop.* ii. p. 208. n. 28 (1890) (Mexico; Guatemala; Honduras).

Papilio branchus, Boisduval, *Consid. Lép. Guatem.* p. 7 (1870) (*hephaestion* = *branchus*! false).

♂. Forewing with a white spot R^2-R^3 and sometimes a trace of a spot R^3-M^1 ; there are also some buffish scales behind R^3 and near the hinder angle in our specimens.—♀ not known.

This form is known to us from: Mexico, Guatemala, and Honduras (San Pedro Sula, in coll. Charles Oberthür).

V. P. belesis f. belesis Bates (1864).

Papilio belesis Bates, *l.c.* (Guatemala); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 298. n. 138 (1864) (*cit. falsa*; Guatemala); Kirby, *Cat. Diurn. Lep.* p. 523. n. 37 (1871); Godm. & Salv., *l.c.* p. 207. n. 27. t. 67. fig. 3. 4. ♂, 5. genit. (1890) (Mexico: Atoyac; Guatemala; Nicaragua); iid., *l.c.* p. 729 (1901) (San Pedro Sula, Honduras).

♂ ♀. Forewing without white spot on disc and in cell. In one of four males from Guerrero, Mexico, the red submarginal spots of the hindwing are minute, while in the only female we have from that province they are as large as in *P. branchus*, but have a position as distant from the cell as in ordinary specimens of *P. belesis*.

We know this form from Mexico: Atoyac and Guerrero, Guatemala, Honduras, and Nicaragua.

Hab. of *P. belesis*: Mexico to Nicaragua.

While in *P. branchus* the form with white patch on the forewing is the common one, in *P. belesis* the white-spotted form is the rarer one.

In the Tring Museum 2 ♂♂ of *f. hephaestion* from Orizaba and "Mexico."—12 ♂♂ and 1 ♀ of *f. belesis* from: Orizaba; Guerrero (O. T. Baron); Escuintla, W. Guatemala, 1100 ft., August 1904 (A. Hall); Polochic valley; San Pedro Sula, Honduras.

135. *Papilio thymbraeus* Boisd. (1836).

Papilio thymbraeus Boisduval, *Spec. Gén. Lép.* i. p. 302. n. 136 (1836) (Tlatlecope, Mexico); Schaus, *Papilio* iii. p. 186 (1883) (*descr.* of adult larva & pupa; on *Chirimoya*).

♂ ♀. Some dots on head, a dot on palpus, on pro-, meso- and metasternum and first abdominal segment, and some speckles on the other abdominal segments, on the sternites as well as the tergites, buffish, often somewhat pinkish.

Wings, *upper side*, olivaceous black, distinctly metallic blue or green. Forewing without markings, fringe white, often brown at apex of wing.—Hindwing with a slender non-spatulate tail, and one or two rows of red spots.

Underside pale olive, somewhat metallic; no black cell-streaks.—Forewing with a red costal basal spot. Hindwing with four basal spots as in *P. branchus* and allies, the posterior one continuous with a line situated on abdominal fold; red submarginal spots edged with buffish white proximally; a row of buffish white curved admarginal bars.

Genitalia: ♂. Apical lobe of harpe finely dentate; dorso-ventral ridge highest dorsally, becoming gradually lower ventrally, with feeble dentition; central process practically non-dentate; ventral process broad, obtuse.

Mature larva and pupa described by Schaus, *l.c.*

Hab. Mexico to Honduras.

Two subspecies.

a. P. thymbræus thymbræus Boisd. (1836).

Papilio thymbræus Boisduval, *l.c.* (Tlatleoche); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 19. n. 228, t. 4, fig. 3 (1846); Doubl., *List Lep. Ins. Brit. Mus.* i. App. p. 3 (1848) (Mexico); Gray, *Cat. Lep. Ins. Brit. Mus.* i. Pap. p. 65. n. 289 (1852) (Mexico); id., *List Lep. Ins. Brit. Mus.* i. Pap. p. 75. n. 306 (1856) (Guatemala; Mexico); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. *Suppl.* p. 68. n. 1129 (1857) (Mexico); Reak., *Proc. Ent. Soc. Philad.* ii. p. 140. n. 11 (1863) (Chiapas); Weidem., *ibid.* p. 148 (1863) (Mexico; Centr. Amer.); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 299. n. 142 (1864) (Mexico; Guatemala); Kirby, *Cat. Diurn. Lep.* p. 523. n. 40 (1871) (Mexico; Guatemala); Oberth., *Et. d'Ent.* iv. p. 80. n. 260 (1880) (Mexico); Schaus, *Papilio* iii. p. 186 (1883) (all the year; open country); Staud., *Exot. Tagf.* i. p. 15, t. 9 (1884) (Mexico; Guatemala); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 206. n. 24. t. 67. fig. 2. genit. (1890) (Mexico; Vera Cruz, Oaxaca; Brit. Honduras; Guatemala); Haase, *Untersuch. Mimicry* i. p. 86. t. 9. fig. 64. ♀ (1893).

Papilio thymbraus (!), Guenée, *Mém. Soc. Phys. Hist. Nat. Genève* p. 379 (1872).

♂ ♀. Hindwing with two rows of red spots.

Hab. Eastern Mexico: Vera Cruz, southward to Honduras.

One of our males from Jalapa has a red dot on the underside of the left forewing between R¹ and R².

In the Tring Museum 28 ♂♂, 9 ♀♀, from: Jalapa, February 1896 and July 1897, and Espinal, June 1896, Vera Cruz (W. Schaus); Orizaba, Vera Cruz, June 1904 (A. Hall); Palin, W. Guatemala, 2500 ft., Aug., Sept. 1904 (A. Hall); Guatemala (Salvini).

b. P. thymbræus aconophos Gray (1852).

Papilio aconophos Gray, *Cat. Lep. Ins. Brit. Mus.* i. Pap. p. 65. n. 290. t. 9. fig. 1. ♀ (1852) (Puebla, Mexico); id., *List Lep. Ins. Brit. Mus.* i. Pap. p. 75. n. 307 (1856) (Puebla); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 299. n. 141 (1864) (Mexico); Kirby, *Cat. Diurn. Lep.* p. 523. n. 39 (1871) (Mexico); Oberth., *Et. d'Ent.* iv. p. 80. n. 261 (1880) (Mexico); Wood, *Ins. Abroad* p. 548. fig. 298 (1883); Staud., *Exot. Tagf.* i. p. 15 (1884) (Mexico); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 206. n. 25 (1890) (Mexico; Puebla, Oaxaca); Haase, *l.c.* (1893); Godm. & Salv., *l.c.* p. 729 (1901) (Guanajuato).

Papilio aconophas (!), Weidemeyer, *Proc. Ent. Soc. Philad.* ii. p. 146 (1863) (Mexico).

♂ ♀. Hindwing with one row of red spots, the discal spots being absent.

Hab. Central and Western Mexico: Puebla, Guanajuato, Jalisco, Guerrero, Oaxaca.

In the Tring Museum, 33 ♂♂, 5 ♀♀, from: Guadalajara, October 1896 (W. Schaus); Guadalajara (Dr. Butler); Coantla, Morelos, 3800 ft., June 1904 (A. Hall); Cuernavaca (Bilimet); Cuernavaca, end of August 1904 (Dr. Gadow); Ayutla, Guerrero, 5. August 1904 (Dr. Gadow); Guerrero (O. T. Baron).

136. *Papilio lysithous* Hübn. (1822?).

Hectorides lysithous Hübner, *Samml. Exot. Schm.* ii. t. 106 (1822?).

Papilio harrisianus, Godart, *Enc. Méth.* ix. *Suppl.* p. 812. n. 138-9 (1824).

Papilio claudius Boisduval, *Spec. Gén. Léop.* i. p. 311. n. 149 (1836) (Rio de Jan.; *harrisianus*, *lains* and *claudius* perhaps one species).

Papilio lysithous, Burmeister, *Descr. Rép. Argent.* v. *Lép.*, *Atlas* p. 9. n. 24 (1879) (Petropolis; N. Friburgo; larva & pupa).

Papilio —, Jones, *Proc. Lit. Philos. Soc. Liverpool* xxxiv. t. 65. fig. 1 (1880) (larva, pupa).

Papilio lysithous, id., *l.c.* xxxvi. p. 44. n. 42 (1882) (larva, pupa).

We unite under this heading all the tailed specimens from Brazil belonging to the present group of *Papilio*, namely the forms described as *lysithous*, *harrisiannus*, *athous*, *sebastianus*, *rurik*, *pomponius*, and *eupatorion*, which have hitherto been considered distinct species. Intergradations between the various forms are rather rare. There are no structural differences between them. Fortunately, the absence of structural differences and the occasional occurrence of intermediate examples are not the only reasons which induce us to treat all these different-looking forms as specifically identical. Three of the forms have been bred from one female (by a correspondent of Mr. H. Wernicke, of Blasewitz). These forms are *pomponius*, *rurik*, and *lysithous*—i.e., the forms with comparatively small red submarginal spots on the hindwing. The various varieties are imitations of species of *Papilio* feeding on *Aristolochia* (*P. ascanius*, *agavus*, etc.).

♂ ♀. Body black; a grey spot on palpus; a grey or buffish line ventro-laterally on abdomen in many specimens. Wings densely scaled above; forewing varying from being all black to being crossed by a broad white band, the band crossing cell, or standing outside cell, or being reduced to a large patch; a red spot at base, often absent.—Hindwing with or without white central area; a series of red submarginal spots, variable in size, the last four larger than the upper three, these three often absent; tail variable in length and width, usually spatulate.

Underside: forewing paler than above, scales smaller in distal area; two red spots at base, one standing in cell and the other before it.—Hindwing as black as above, no distinct cell-lines, three red basal spots, the posterior one produced into a long line on abdominal fold.

Genitalia: ♂. Apical edge of harpe very little produced, broadly rounded; dorso-ventral ridge ending abruptly ventrally, the ventral corner not more elevated than the rest of the ridge; central process widened at apex, dentate apically and dorso-apically, ventral apical angle marked by a rather prominent tooth, proximally of which there are no other teeth.

Early stages described by Mr. E. D. Jones, *l.c.*, and Burmeister, *l.c.*

Hab. Brazil; Eastern Paragnay.

We arrange the varieties in two groups:

A. Red submarginal spots of hindwing large, longer than broad above.

a'. *P. lysithous* f. *platydesma* nov.

Papilio harrisiannus (!), Boisduval (*non* Swainson 1822, *err. det.*), *Spec. Gén. Léop.* i. p. 310. n. 147 (1836) (Brazil).

Papilio harrisiannus, Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 184 (1846) (*partim*; Brazil); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 41. n. 210 (1852) (*partim*; Brazil); *id.*, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 57. n. 222 (1856) (*partim*; Brazil); Ménière, *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 4. n. 68 (1857) (Brazil); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 299. n. 154 (1864) (Brazil); Kirby, *Cat. Diurn. Lep.* p. 524. n. 53 (1871) (*partim*; Brazil); Capronn., *Ann. Soc. Ent. Belg.* xvii. p. 9. n. 7 (1874) (Gavia, August); Burm., *Descr. Rép. Argent.* v. *Lép.*, *Atlas* p. 9. n. 23 (1879) (Rio de Jan.; larva & pupa); Oberth., *Et. d'Ent.* iv. p. 76. n. 240 (1880) (Brazil); Staud., *Ecot. Tugf.* i. p. 15 (1884) (Brazil); Haase, *Untersuch. Mimicry* i. p. 85 (1893) (Brazil); *id.*, *l.c.* ii. p. 92 (1893); Bönningh., *Verh. Ver. Nat. Unterh.* ix. p. 27 (1895) (Rio).

♂ ♀. White band of forewing broad, continued across cell. On hindwing the band usually reaching to M², the last partition of the band merged together with the red submarginal patch, the band mostly rather narrower in male than in female, being in the male reduced proximally, the white cell-patch occasionally absent in

this sex, and the white discal patches small and much shaded with black ; a row of seven red submarginal spots, the last double.

We know this form from the Province of Rio de Janeiro and from Matto Grosso ; it is doubtless more widely distributed.

In the Tring Museum 7 ♂♂, 2 ♀♀, from : Tijuca, Rio de Janeiro.

A specimen from Matto Grosso in coll. Adams.

b. P. lysithous f. harrisianus Swains. (1822).

Papilio harrisianus Swainson, *Zool. Illustr.* iii. *Ent.* ii. t. 109 (1822) (hab. ? prob. S. Amer.) ; Doubl., *List Lep. Ins. Brit. Mus.* i. p. 14 (1845) (Brazil) ; id., Westw. & Hew. *Gen. Diurn. Lep.* i. p. 17. n. 184 (1846) (*partim* ; Brazil) ; Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 41. n. 210 (1852) (*partim* ; Brazil) ; Kirby, *Cat. Diurn. Lep.* p. 524. n. 53 (1871) (*partim*).

Papilio claudius Boisduval, *Spec. Gén. Lép.* i. p. 311. n. 149 (1836) (*partim*).

Papilio athous Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 299. n. 155 (1864) (*nom. nud.*) ; id., *Reise Novara, Lep.* p. 46. n. 35 (1865) (Brazil) ; Kirby, *l.c.* p. 524. n. 54 (1871) ; Stand., *Exot. Tagf.* i. p. 15 (1884) (Brazil).

A specimen in the British Museum agreeing with Swainson's figure is presumably the type of *harrisianus*. Boisduval (1836) described the preceding form as *harrisianus* (erroneously spelling the name *harrissianus*), since when that broad-banded form has always been treated as being the true *harrisianus*. Felder's *athous* is nothing but Swainson's *harrisianus*.

♂♀. White band of forewing in male from inner margin to SC³, the first and last spot often absent, the band standing outside cell, but usually touching it at lower angle, where the band is more or less angulate or interrupted ; occasionally a vestige of a white patch in apex of cell ; in female the band vestigial from lower angle of cell forward.—White discal area of hindwing not extending beyond M¹, much narrower in female than in male, the patch occupying in male more than half the cell, in female restricted to apex of cell and proximally ill-defined ; upper three red submarginal spots absent or vestigial in male, more or less distinct in female.

We know this form from Rio de Janeiro and Espiritu Santo.

In the Tring Museum 4 ♂♂, 2 ♀♀, from : Rio de Janeiro ; Leopoldina, Espiritu Santo.

c'. P. lysithous f. oedipus Feld. (1865).

Papilio harrisianus, Godart, *Enc. Méth.* ix. *Suppl.* p. 812. n. 138-9 (1824) (*partim*).

Papilio oedipus Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 299. n. 156 (1864) (*nom. nud.*) ; id., *Reise Novara, Lep.* p. 47. n. 36 (1865) (Brazil) ; Kirby, *Cat. Diurn. Lep.* p. 524. n. 55 (1871) (Brazil) ; Stand., *Exot. Tagf.* i. p. 15 (1884) (Brazil).

Papilio sebastianus Oberthür, *Et. d'Ent.* iv. p. 70. n. 241. t. 2. fig. 4 (1880) (Brazil).

♂♀. White band of forewing reduced to a large double patch M¹—SM², there being usually also a small streak behind SM² and another in front of M¹, the latter streak occasionally developing to a triangular patch. In one of our males from Bahia the white double patch is replaced by a narrow yellowish one which, anteriorly, does not reach M¹.—Hindwing without white band or patch ; the four posterior submarginal spots large, the anterior ones small and often absent.

Known to us from Bahia, Minas Geraës, Espiritu Santo.

In the Tring Museum 13 ♂♂ from : Bahia ; Minas Geraës ; Espiritu Santo.

d'. P. lysithous f. lysithous Hübn. (1822 ?).

Hectorides lysithous Hübn., *Samml. Exot. Schw.* ii. t. 106 (1822 ?); Kirby, *ibid.* ed. ii. p. 90. t. 319. fig. 3. 4. (190—?).

Papilio claudius Boisduval, *Spec. Gén. Léop.* i. p. 311. n. 149 (1836) (*partim*).

Papilio lysithous, Doubleday, *List Lep. Ins. Brit. Mus.* i. p. 14 (1844) (Brazil); *id.*, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 182 (1845) (*partim*; Brazil); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 41. n. 209 (1852) (Brazil); *il.*, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 57. n. 221 (1856) (Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 4. n. 66 (1857) (Brazil); Oberth., *Et. d'Ent.* iv. p. 77. n. 242 (1880) (Brazil); Staud., *Exot. Tagf.* i. p. 14. t. 9 (1884) (Brazil); Haase, *Untersuch. Mimicry* i. p. 85 (1893) (Brazil); *id.*, *l.c.* ii. p. 92. t. 10. fig. 70 (1893); Bönningh., *Verh. Ver. Naturw. Unterh. Hamburg* ix. p. 27 (1895) (Organ Mts.; not at Rio); Eimer, *Orthogen.* p. 137 (1897).

Papilio lysithous var. *brevifasciatus* Weymer, *Stett. Ent. Zeit.* lv. p. 312 (1895) (Rio Grande do Sul).

Papilio extendatus *id.*, *l.c.* p. 313 (1895) (Rio Grande do Sul).

Papilio agavus, Peters, *Illustr. Zeitschr. Ent.* ii. p. 52 (1897) (Nova Friburgo, *partim*).

♂♀. Forewing: white band narrow (rarely buffish on both wings), usually reaching SC^3 , but often not extending forward beyond lower angle of cell (*brevifasciatus*), in most specimens tapering, but sometimes of almost even width, variable in breadth, being posteriorly in some individuals twice as wide as in others; a row of distinct white marginal spots in some specimens, such spots being often indicated in the preceding forms.—White band of hindwing usually stopping short at M^1 , but occasionally reaching to M^2 (*extendatus*), in the latter case the band mostly a little more distal in position, the cell-patch being smaller and the spots around apex of cell larger than in ordinary specimens; red submarginal spots variable in size and number, the last four smaller than in the preceding forms; white marginal spots sometimes a little enlarged; tail sometimes with red spot on *underside*.

In a male from Minas Geraës in coll. Hewitson (Brit. Mus.), with broad band on fore- and hindwing and white fringe-spots to forewing, there is some white scaling proximally of the red submarginal spots of the hindwing.

We know this form from the provinces of Minas Geraës, Rio de Janeiro, Santa Catharina, Parana, Sao Paulo, Rio Grande do Sul.

In the Tring Museum 35 ♂♂, 6 ♀♀, from: Petropolis, January 1898 (J. Foetterle); Nova Friburgo (Peters); Jundiaby; Sao Paulo; Castro, Parana (E. D. Jones); Rio Grande do Sul.

e'. P. lysithous f. rurik Eschsch. (1821).

Papilio rurik Eschscholtz, in Kotzeb., *Reise* iii. p. 202. n. 1 (1821) (S. Catharina).

Papilio rurikia *id.*, *l.c.* t. 1. fig. 1a. 1b (1821); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 41. n. 207 (1852) (Brazil); *id.*, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 56. n. 218 (1856) (Rio Grande do Sul); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 304. n. 159 (1864) (S. Catharina); Rio Grande do Sul); Kirby, *Cat. Diurn. Lep.* p. 524. n. 58 (1871) (Brazil); Staud., *Exot. Tagf.* i. p. 15 (1884) (Brazil); Haase, *Untersuch. Mimicry* i. p. 86 (1893); Weym., *Stett. Ent. Zeit.* lv. p. 312. n. 3 (1895) (= *laisus*).

Papilio harrisiams, Godart, *Enc. Méth.* ix. *Suppl.* p. 812. n. 138-9 (1824) (*partim*).

Papillon laius Roger, *Bull. Soc. Linn. Bordeaux* i. p. 160 (1826) (Brazil).

Papilio laius Boisduval, *Spec. Gén. Léop.* i. p. 311. n. 148 (1836) (Brazil); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 14 (1845) (Brazil); *id.*, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 183 (1846) (Brazil); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 41. n. 208 (1852) (Brazil); *id.*, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 57. n. 220 (1856) (Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 4. n. 67 (1857) (Brazil); Felder, *l.c.* p. 304. n. 158 (1864) (var. of *rurikia* ?); Kirby, *l.c.* p. 524. n. 57 (1871); Staud., *l.c.* p. 15 (1884) (Brazil); Oberth., *Et. d'Ent.* xii. p. 5. u. 9. t. 7. fig. 47 (1888) (Paraguay); Haase, *l.c.* p. 86 (1893); Bönningh., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 27 (1895) (Icaraby); Mahilde, *Guia Pract. Borbol. Rio Grande do Sul* p. 47 (1896).

♂ ♀. White band of forewing as in f. *oedipus*, very variable in width, sometimes not wider than in broad-banded specimens of f. *lysithous*, never continued to costal margin, occasionally reduced to a patch M^2-SM^2 and a streak behind SM^2 , occasionally buffish; white marginal dots sometimes very distinct.—No white band or patch on hindwing; usually seven red submarginal spots, upper three not rarely vestigial or absent (from upperside), last four sometimes nearly as large as in f. *oedipus*; white marginal spots often somewhat enlarged; tail with red spot on *underside* in a small percentage of specimens (as in Eschscholtz's figure).

We know this form from Paraguay, Santa Catharina and Rio Grande do Sul.

In the Tring Museum 32 ♂♂, 19 ♀♀, from: Sapneay, Paragnay, August 1900 and October 1904 (W. Foster); Yhu, Paraguay, September—December 1896 (Audeer); Theresopolis, S. Catharina, November 1904—February 1905 (J. Michaelis); Rio Grande do Sol.

f'. *P. lysithous* f. *pomponius*.

Papilio pomponius Hopffer, *Stett. Ent. Zeit.* xxvii. p. 25. n. 5 (1866) ("Mexico" error loci); Kirby, *Cat. Diurn. Lep.* p. 567. n. 341 (1871) ("Mexico"); Honr., *Berl. Ent. Zeitschr.* xxx. p. 296. t. 6. fig. 4. ♀ (1886) (Rio Grande do Sul; ♂ ♀); Weym., *Stett. Ent. Zeit.* lv. p. 314. n. 6 (1895) (Rio Grande do Sul); Bönningh., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 27 (1895) (one specimen, 8 miles from Nova Friburgo); Mabilde, *Guia Pract. Borbol. Rio Grande do Sul* p. 48 (1896).

Papilio lysithous, Lathy, *Trans. Ent. Soc. Lond.* p. 69. n. 36 (1904).

♂ ♀. Forewing black, usually with white marginal spots; white band absent, often vestigial, rarely represented by a distinct line from near costal to inner margin, or by a short band extending from M^1 to inner margin.—Hindwing without white band or patch, fringe-spots large as a rule; four to seven red submarginal spots, the three upper ones usually vestigial; proximally of these spots sometimes some white scales.

We know this form from Santa Catharina and Rio Grande do Sul (where its model, *Papilio perrhebus*, is also found); Bönninghansen records it from Nova Friburgo.

In the Tring Museum 8 ♂♂, 2 ♀♀, from: S. Catharina and Rio Grande do Sul.

g'. *P. lysithous* f. *eupatorion* Lucas (1857).

Papilio eupatorion Lucas, in Casteln., *Voy. Amér. Sud. Zool.* iii. *Ent.* t. 2. fig. 2 (1857—coll. Oberthür); Kirby, *Cat. Diurn. Lep.* p. 567. n. 334 (1871) (Am. mer.); Oberth., *Et. d'Ent.* iv. p. 76. n. 239 (1880) (Brazil; type).

♂. Like f. *pomponius*; but forewing with a broad buffish white marginal band, marginal spots of hindwing enlarged and white dots at proximal side of red submarginal spots distinct, the upper ones larger than the respective red spots.

Only one specimen known, in coll. Oberthür, from Brazil.

137. *Papilio asius* Fabr. (1781).

Papilio Eques Trajanus asius Fabricius, *Spec. Ins.* ii. p. 5. n. 17 (1781) (S. Amer.); Fabr., *Mant. Ins.* ii. p. 3. n. 17 (1787); Gmelin, *Syst. Nat.* i. 5. p. 2229. n. 283 (1790) (S. Amer.); Fabr., *Ent. Syst.* iii. 1. p. 8. n. 21 (1793).

Papilio Eques Trajanus astyagas Drury, *Illustr. Exot. Ins.* iii. p. 47. t. 35. fig. 4. & Index (1782) (Rio de Janeiro).

- Iphiclides asius*, Hübner, *Samml. Exot. Schm.* ii. t. 92 (1818[?]); Kirby, *ibid.* ed. ii. p. 93. t. 306. fig. 1. 2 (190-?).
- Papilio asius*, Godart, *Enc. Méth.* ix. p. 55. n. 84 (1819) (Brazil); Boisd., *Spec. Gén. Lép.* i. p. 309. n. 146 (1836) (Rio de Janeiro); Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vii. p. 48 (1838); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 14 (1845) (Brazil); Butler, *Cat. Diurn. Lep. descr. Fabr.* p. 239. n. 18 (1869) (Rio de Janeiro); Oberth., *Et. d'Ent.* iv. p. 76. n. 238 (1880) (Brazil); Staud., *Exot. Tagf.* i. p. 14 (1884); Haase, *Untersuch. Mimicry* i. p. 85 (1893) (Brazil); Böuningh., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 27 (1895) (Nichteroy, Rio de Janeiro, rare); Eimer, *Orthogen.* p. 137 (1897).
- Papilio manlius* Perty, *Delect. Anim. Art.* p. 151. t. 29. fig. 1. 1b (1830-34) (Minas Geraés).
- Papilio astygas*, Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 17. n. 185 (1846) (Brazil); Gray, *Cat. Lep. Ins. Brit. Mus.* p. 42. n. 219 (1852); id., *List Lep. Ins. Brit. Mus.* i. *Pop.* p. 59. n. 232 (1856) (Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 4. n. 69 (1857) (Brazil); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 300. n. 160 (1864) (Brazil).
- Papilio asius* (?), Kirby, *Cat. Diurn. Lep.* p. 524. n. 59 (1871) (Brazil).
- Papilio assius* (!), Mabilde, *Guia Pract. Borbolet. Rio Grande do Sul* p. 47 (1896).

A very interesting species, connecting the *lysithous* group with the *marcellus* group.

♂. The band of the wings is variable in width, often entering the cell of the forewing, this cell-spot occasionally extending down to M^1 ; scales of forewing somewhat reduced in width. Besides a spot on the abdominal fold and an anal spot there are never more than two red spots situated between R^3 and M^2 , the upper one being often missing; these spots are repeated on the underside, the abdominal one being produced proximad to near base, four more red spots being present in the basal area, namely two at costal margin, one behind C and the fourth in the cell. In shape of the hindwing *asius* resembles more the *marcellus* group than the members of the present group.

Scent-organ better developed than in any other member of the present group; the abdominal edge bent upwards, forming a narrow pocket; vein SM^2 and a narrow stripe in front of SM^2 and another behind it covered with small scent-scales, the scaling having partly a somewhat woolly appearance.

Genitalia: ♂. Apical lobe of harpe asymmetrical, large, long, denticulate ventrally; dorso-ventral ridge with some prominent teeth ventrally; central process spatulate, entire or feebly denticulate; ventral process small.

Early stages not known.

Hab. Brazil and Eastern Paraguay.

In the Tring Museum 52 ♂♂ from: Bahia; Minas Geraés; Espiritu Santo; Petropolis; (G. Foetterle); Rio de Janeiro (E. May); Bahum, Sao Paulo (Dr. Hempel); Castro, Parana (E. D. Jones); Yhn, Paraguay (Audeer).

A ♀ in coll. H. J. Adams.

XIV. Marcellus Group.

For characters see p. 655.

Ten species:

1. SC' of forewing present.

a. Forewing black from apex of cell to distal margin, with a pale submarginal line or row of spots and one or two short pale costal bands within this black area.

a'. Red line of underside of hindwing edged with white

proximally Species No. 138.

- b*¹. Red line without white border.
*a*². Hindwing, above, with complete black median band.
*a*³. Green subapical cell-bar of forewing widely separate from green discal band Species No. 140.
*b*³. White or greenish subapical cell-bar of forewing continuous with the discal band.
*a*⁴. Fourth and fifth green cell-bars of forewing merged together Species No. 139.
*b*⁴. These bars widely separate.
*a*⁵. Submarginal spots of forewing more or less rounded. Species No. 141.
*b*⁵. These spots transverse, linear Species No. 142.
*b*². Median band of upperside of hindwing widely interrupted or marked only at costal margin.
*c*³. Black subbasal band of upperside of hindwing very thin beyond cell Species No. 143.
*d*³. This band broad throughout.
*c*⁴. Red line of underside of hindwing stopping short at cell Species No. 144.
*d*⁴. Red line continued to brown distal border Species No. 145.
b. Forewing with very broad transparent submarginal area Species No. 146.
 II. *SC'* of forewing absent Species No. 147.

138. *Papilio marcellus* Cram. (1777).

- Petiver, *Mus. Petiv. Cent.* p. 50. n. 502 (1699); Catesby, *Nat. Hist. Carol.* ii. p. 100. t. 100 (1743); Edw., *Nat. Hist. Birds* i. p. 34. t. 34 (1743).
Papilio Eques Achirus ajax Linné, *Syst. Nat.* ed. x. p. 462. n. 26 (1758) (*partim*, only cit. "Edw. av. 34"; descript. and cit. "Raj. ins. iii. n. 2" do not apply to this species); id., *Syst. Nat.* ed. xii. p. 750. n. 32 (1767) (*partim*); Fabr., *Syst. Ent.* p. 455. n. 49 (1775) (*partim*); Esper, *Schn.* i. *Fortis.* p. 1. t. 51. fig. 1 (1780) ("S. France" errore); Fabr., *Spec. Ins.* ii. p. 20. n. 79 (1781) (*partim*); id., *Mant. Ins.* ii. p. 10. n. 90 (1787); Schneid., *Europ. Schn.* p. 54. n. 3 (1788); Villiers, *Car. Linn. Ent.* ii. p. 2. n. 1 (1789) (Amer. bor., "Helvetia and Germania" errore); Jabl. and Herbst, *Naturs. Schn.* iii. p. 144. n. 96. t. 42. fig. 5. 6 (1790) (synon. *partim*); Gmelin, *Syst. Nat.* i. 5. p. 2238. n. 32 (1790) (*partim*); Fabr., *Ent. Syst.* iii. 1. p. 33. n. 97 (1793).
Papilio Eques Achirus protesilaus Linné, *Syst. Nat.* ed. x. p. 463. n. 29 (1758) (*partim*; citat. Catesb.); id., *Mus. Lud. Ulr.* p. 209. n. 28 (1764) (*partim*; var. β , cit. "Seb. mus. i. t. ii. f. 2" excepta); Gmelin, *Syst. Nat.* i. 5. p. 2243. n. 39 (1790) (sub citat.).
Papilio Eques ajax, Lange, in Linné, *Syst. Nat.* p. 462. n. 26 (1760) (*partim*).
Papilio Eques Achirus marcellus Cramer, *Pap. Escot.* ii. p. 4. t. 98. fig. F. G. (1777) (spring form).
Papilio ajax, Seligmann, transd. Houtt., *Verz. Vögl. Zeldz. Vogel.* ii. p. 54. t. 67 (1772) (Maryland); Borkh., *Nat. Eur. Schn.* i. p. 112. n. 3 (1788) ("S. France"; N. Amer.); id., *l.c.* p. 249. n. 3 (1788) (synon. *partim*); Abbot & Smith, *Ins. Georgia* i. p. 7. t. 4 (1797) (metam.); Fabr., *Epit. Ent. Nomencl.* p. 128 (1797) (*partim*; Am. bor.); Palisot, *Ins. Afr. Amer.* p. 71. *Lep.* t. 2. fig. 2 (1805); Ochsenh., *Schn. Eur.* i. 2. p. 117. n. 1 (1808) ("Italy and S. France," errore); Laspeyr., *Jen. Allg. Lit. Zeit.* p. 98 (1809) (Linné's *ajax* is not the *ajax* of Esper!); Ochsenh., *Schn. Eur.* iv. p. 149 (1816); Godart, *Enc. Méth.* ix. p. 52. n. 79 (1819) (synon. *partim*); Lucas, *Lép. Eur.* p. 9. t. 14. fig. 2 (1834) ("Greek Archip."; fig. mala); Doubl., *List Lep. Ins. Brit.* *Mus.* i. p. 9 (1845); id., in Westw., *Arc. Ent.* i. p. 61 (1845) (Florida, habits); id., Westw. &

- Hew., *Gen. Diurn. Lep.* i. p. 15. n. 133 (1846); Kirtl., *Proc. Ent. Soc. Lond.* (2). i. p. 101 (1851) (south shore of L. Erie; Ohio; larva on *Anona triloba*); Gray, *List Lep. Ins. Brit. Mus.* i. p. 33. n. 155 (1852) (*marcellus* = var. of *ajax*); Lucas, in Chenu, *Enc. Hist. Nat. Pap.* i. fig. 1 (1851-53); Dutreux, *Stett. Ent. Zeit.* xv. p. 142 (1854) (Faro, Portugal;—imported, or local erroneous); Keferst., *ibid.* p. 330 (1854) (Dutreux's *ajax* from Portugal is *ajax* Boisduv.); Lucas, *Bull. Soc. Ent. France* p. 9 (1855) ("Portugal" teste Keferstein, "Greece" teste Lucas); Gray, *List Lep. Ins. Brit. Mus.* i. p. 44. n. 163 (1856); Ménétr., *Enum. Corp. Anim. Petrop., Lép.* i., p. 3. n. 47 (1857); Gosse, *Letters from Alabama* p. 51. figs. (1859) (larva, pupa); id., *l.c.* p. 148 (1859); Morris, *Syn. Lep. N. Am.* i. p. 8. n. 11 (1862) (*ajax* = *marcellus*); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 146 (1863) (*marcellus* ?); Kirkp., *ibid.* iii. p. 328 (1864) (Cleveland, Ohio, common); Butl., *Cat. Diurn. Lep. descr. Fabr.* p. 241. n. 26 (1869); Parker, *Amer. Entom.* ii. p. 175 (1870) (Iowa); Edw., *Canad. Ent. ii.* p. 115. 133. 162 (1870) (*ajax* and *marcellus* one species, proved by breeding); id., *l.c.* iii. p. 70 (1871) (bred); Scudder, *ibid.* iv. p. 74. 81 (1872) (Georgia, Abbot's MS.); Meldola, *Ann. Mag. N. H.* (4). xii. p. 301 (1873) (substance waste in pupal state); Pagenst., *Verh. Nat. Med. Ver. Heidelb.* i. p. 108 (1874); Gerh., *Macro-Lep. N. Amer.* p. 25. n. 443 (1878); Dury, *Cincinnati Soc. Nat. Hist.* i. p. 12 (1878) (Cinc., common); French, *Rep. Ins. Illin.* vii. p. 135 (1878); Morris, *Canad. Ent.* xi. p. 203 (1879) (Ontario, local); Oberth., *Et. d'Ent.* iv. p. 65. n. 176 (1880); Clayp., *Canad. Ent.* xii. p. 120 (1880) (Ohio, April); Middl., *Rep. Ins. Illin.* x. p. 74 (1881); Edwards, *Canad. Ent.* xiv. p. 27 (1882) (connection between *ajax*, *walshi* and *telamonides*; life history); Auriv., *Kongl. Sv. Vet. Ak. Handl.* xix. 5. p. 30. n. 28a (1882) (recensio critica); Gruber, *Jena. Zeitsch. Naturw.* xvii. p. 473. t. 7. f. 16-19. l. (1884); id., *l.c.* xviii. p. 881 (1884); id., *Papilio* iv. p. 88. t. 2. f. 16-19 (1884) (transf.); id., *l.c.* p. 188 (1884) (correction); Edw., *Ent. Amer.* i. p. 213 (1885) (larvae will not eat sassafras and spice-wood); id., *Canad. Ent.* xviii. p. 15 (1886) (larva on *Parparac*, refusing spice-wood and sassafras in W. Va.); French, *Bull. East. U. St.* p. 84 (1886); Hancock, *Amer. Nat.* xx. p. 976 (1886) (Chicago, migrating northward); Hulst., *Ent. Amer.* ii. p. 182 (1886) (Long I., end June '86, one specim.); Riley, *Insect Life* i. p. 161 (1888) (parasite: *Trogus exesorius*, *Pimpla annulipes*); Edw., *Bull. U. St. Nat. Mus.* xxxv. p. 9 (1889) (liter. on transf.); Skinner & Aaron, *Canad. Ent.* xxi. p. 126 (1889) (Philadelphia, rare); Eimer, *Arth. Verwandtsch. Schmett.* p. 195 (1889); Pack., *Fifth Rept. U.S. Ent. Comm.* p. 669 (1890) (larva on *Asimina triloba*); Mayn., *Mem. N. Amer. Bull.* p. 3. n. 1 (1891); Staley, *Canad. Ent.* xxiv. p. 203 (1892) (Marshall, Missonri, f. *telamonides* rare, *marcellus* not uncommon); Davis, *Journ. N. York Ent. Soc.* i. p. 47 (1893) (Staten I., N.Y., 2 ex.); Jones, *Ent. News* iv. p. 190 (1893) (Wilmington, N.C.); Beutenm., *Bull. Amer. Mus. N. H.* v. p. 241 (1893) (N. York; descr. of l., p., i.); Weed, *Psyche* vii. p. 130 (1894) (N.E. Miss.); Davis, *Journ. N. York Ent. Soc.* iii. p. 141 (1895) (Staten I., N.Y., seen June 30); Osburn, *Ent. News* vi. p. 282. n. 43 (1895) (Tennessee, common, iv. to x., two broods); Deard., *ibid.* vi. p. 296 (1895) (Lonsdale, R.I., July 19, one ex.); Langl., *ibid.* vi. p. 314 (1895) (Chicago); Hills, *Canad. Ent.* xxviii. p. 190 (1896) (Toronto, June); Anonym., *ibid.* xxviii. p. 190 (1896) (Port Hope, Ontario; never before observed so far east); Gibson, *ibid.* xxviii. p. 294 (1896) (Toronto, June); Bubua, *Ent. News* viii. p. 98 (1897) (Cleveland, Ohio; plentiful, three forms); Edw., *Bull. N. Amer.* iii. *Pap.* v. (1897) (results of breeding); Gibson, *Rept. Ent. Soc. Ontario* xxvii. p. 105 (1897) (Toronto, June and July); Moffat, *ibid.* p. 109. n. 79 (1897) (Pt. Hope, end of May and June; Toronto); Duzee, *Bull. Buffalo Soc. N. Sc.* v. p. 107. n. 1 (1897) (Buffalo); Snyder, *Canad. Ent.* xxix. p. 119 (1897) (Evanston, Ill., very rare); Christ, *Mitt. Schweiz. Ent. Ges.* ix. p. 279 (1897); Eimer, *Orthogen.* p. 309 (1897); Troxler, *Canad. Ent.* xxx. p. 257 (1898) (Louisville, Ky., ♀ with yellow markings, May); Holl., *Bull. Book* p. 307. n. 1. t. 2. f. 14, t. 6. fig. 11. 12, t. 44. fig. 1-4 (1899); Weazel, *Ent. News* xi. p. 643 (1900) (Wilmington, N.J., two ex.); Beutenm., *Bull. N. York City* p. 7. n. 5. fig. ♂ (1902); Comst., *Ent. News* xiii. p. 76 (1902) (L. Josephine, Fla.); Walk., *Rept. Ent. Soc. Ontario* xxxii. p. 85 (1902) (Point Pelee, Leamington); Briml. & Sherm., *Ent. News* xiv. p. 230 (1903) (Raleigh, N.C.).
- Papilio protesilaus*, Fabricius, *Ep. Ent. Nomencl.* p. 128 (1797) (*partim*; Am. Sept.).
- Princeps heroicus ajax* Hübner, *Samml. Exot. Schm.* i. t. 106 (1806-?).
- Iphiclides ajax*, id., *Verz. bek. Schm.* p. 82. n. 836 (1818?); Scudd., *Proc. Boston Soc. N.H.* xvi. p. 117 (1873) (substance waste; *walshi* and *telamonides* from wintering pupae, *marcellus* offspring of both these forms; id., *Amer. Nat.* viii. p. 257 (1874); Meldola, *Ann. Mag. N. H.* (4). xiv. p. 239 (1874) (substance waste); Scudder, *Bull. East. U. St. & Can.* ii. p. 1264. t. 15. fig. 11. t. 35. fig. 26—29. genit., t. 56. fig. 9. head, etc. (1889); id., *Psyche* viii. p. 208. t. 5. f. 2. 1. juv. (1898); Dyar, *Bull. U. St. Nat. Mus.* lii. p. 2. n. 5 (1902); Kirby, in Hübner, *Samml. Exot. Schmett.* ed. ii. p. 99. t. 106. fig. 3. 4 (190-?).
- Papilio marcellus*, Boisduval & Lecote, *Hist. Gén. Lép. Amér. Sept.* i. p. 8. t. 2. fig. 1—4. l., p., i.

- (1835) (summer form); Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vii. p. 47 (1838); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 8 (1845); id., in Westw., *Proc. Ent.* i. p. 61 (1845) (Virginia, Ohio, etc.); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 15. n. 132 (1846); Kirtl., *Proc. Ent. Soc. Lond.* (2). i. p. 101 (1851) (differs from *ajax* in flight); Ménétr., *Enum. Corp. Anim. Petrop., Lip.* i. p. 3. n. 46 (1857); Newm., *Proc. Ent. Soc. Philad.* i. p. 26 (1861) (N. Jersey; on *Pawpaw*); Morris, *Syn. Lep. N. Am.* i. p. 9. n. 12 (1862); Weidem., *Proc. Ent. Soc. Philad.* iii. p. 146 (1863) (= *ajax* ?); Kirkp., *Proc. Ent. Soc. Philad.* iii. p. 328 (1864) (Cleveland, Ohio, common); Edw., *Amer. Entom.* ii. p. 305 (1870) (ovipositing); id., *Canad. Ent.* iii. p. 70 (1870) (bred); Saund., *ibid.* vi. p. 140 (1874) (Essex Co.); Ison, *Rept. Ent. Soc. Ontario* p. 15 (1876) (Cleveland, rather common); Moffat, *ibid.* p. 10 (1881) (Long Point & Ridgeway); Mündt, *Canad. Ent.* xv. p. 89 (1883) (Pontiac, Illin., May and later); Saund., *ibid.* xvi. p. 50 (1884) (Lake Erie); id., *Rept. Ent. Soc. Ontario* xv. p. 20 (1885) (Point Pelee, L. Erie); Pack., *Fifth Rept. U.S. Ent. Comm.* p. 669 (1890) (larva on *Asimina triloba*); Moffat, *Rept. Ent. Soc. Ontario* xxvii. p. 79 (1897) (London, Ont.); Bethune, *ibid.* xxviii. p. 33 (1898) (Pt. Hope); id., *ibid.* xxx. p. 101 (1900) (Pt. Hope).
- Papilio protesilaus* "Drury," Reitzenstein, *Cat. Lep. N. Orleans* (1863) (Greville, rare;—doubtless an error of identification, probably form of *marcellus*).
- Pathysa marcellus*, Reakirt, *Proc. Ent. Soc. Philad.* iii. p. 504 (1864).
- Papilio ajax* var. *marcellus*, Fletcher, *Canad. Ent.* xxxi. p. 8 (1899) (Cowichan Rd., Vancouver I., strange occurrence!).

Owing to Linné's short and vague descriptions, and his frequent quotation of figures and previous descriptions which have nothing to do with the animal described, the nomenclature of many Linnean species is much involved. The nomenclatorial difficulties created by Linné have often been enhanced by post-Linnean authors, many of whom were quite arbitrary in the application of names and non-critical to an amazing degree. However, the difficulties would have long disappeared to a great extent, if the authors of the second third of the nineteenth century, when it was still early enough to mend matters without much inconvenience, had had the courage of being thorough in nomenclatorial matters. The *Asimina* Swallowtail of North America, usually called *ajax* Linné, is a striking instance.

The Swallowtails found in the Atlantic States are all common insects. There occur five species, not counting the southern species *P. palamedes* and *polydamas*. As three of the five are recognisably described by Linné in *Syst. Nat.* ed. x. and later, there remain two—namely, the *Asimina* Swallowtail allied to the European *podalirius* and the Parsnip Swallowtail allied to *machaon*. For which of the two species did Linné propose the name *ajax*?

Linné's description in *Syst. Nat.* ed. x. p. 462 (1758) is as follows:

Ajax. 26. P.E. alis obtuse caudatis concoloribus fuscis; fasciis flavescensibus, angulo ani fulvo.

Raj. ins. III. n. 2. *Edw. av.* 34.

Habitat in America boreali.

This description certainly does not fit the *Asimina* Swallowtail, which has a red anal angle; but applies very well to the Parsnip Papilio, Linné describing the similar, but more extended yellow *machaon* as follows:

Machaon. 27. P.E. alis caudatis concoloribus flavis; fasciis fuscis; angulo ani fulvo.

We draw attention to *angulo ani fulvo* appearing in both descriptions.

Linné quotes two previous authors under *ajax*. However, the insects described by Ray and the one described and figured by Edwards are not only widely different from one another, but Linné's description fits neither the one nor the other. The insect of Ray is doubtless the yellow female or the male of *Papilio glaucus*. Ray's description is as follows:

2. *Papilio alis amplissimis, flavicante et nigro coloribus pulcherrime variegatis, interioribus caudatis, major Virginiana. Diurnarum prima, omnium maxima*, Mouffet. *Theat. Insect.* p. 98.

Haec praecedenti,* excepta magnitudine, qua eam excellit, simillima est, ut dubitem an accidentaliter potius quam specificè, ut vocant, ab ea differat: ideoque quamvis exotica sit, a praecedente minime separandam censemus.

Mouffet's figure referred to by Ray is a bad representation of a yellow *P. glaucus*. The figure is very large, the apex of the forewing being produced into a long acute hook, and the tail being long, curved and pointed. Linné says of *ajax*: *alis obtuse (!) caudatis*.

The second reference under Linné's *ajax* is Edwards, *Nat. Hist. Birds* i. t. 34.

The insect here represented is the *Asimina* Swallowtail. The anal spot is expressly described in the text as being bright red, while Linné calls that spot of *ajax* fulvous, as in the case of *machaon*. How is it that Linné quotes this figure under *ajax*, although it does not at all conform to the description? We think it was a mere oversight; he did not mean to put the reference to Edwards's figure under *ajax* but under *protesilaus*, as appears to us proved by the description of *protesilaus* and the various references given by Linné under that heading. The description of *protesilaus* and the references are in *Syst. Nat.* ed. x. p. 463, as follows:

Protesilaus. 29. P.E. alis caudatis subconcoloribus albidis: fasciis fuscis: unica subtus sanguinea, angulo ani rubro.

Pet. Mus. 50. n. 502.

Sloan. jam. 2. p. 218. t. 239. f. I. 2.

Mer. surin. 43. t. 43.

Seb. mus. I. t. 11. f. 2.

Catesb. car. 2. t. 100.

Habitat in America septentrionali.

Simillimus Podalirio Europae australis & Africae; an satis diversus?

Now, the first citation under *protesilaus* (Petiver) and the last quotation (Catesby) refer both to recognisable descriptions and figures of the North American *Asimina* Swallowtail!! Merian's figure represents the white South American insect usually known by the name of *protesilaus*. Seba's and Catesby's figures represent some species of the Nymphalid genus *Megalura*. Since Linné considered all these insects as being one species—which, moreover, was in his opinion only doubtfully distinct from the European *podalirius*—is it likely that he believed Edwards's figure to represent a different species? An unambiguous answer is given by Linné in *Mus. Lud. Ubr.* p. 209 (1764). In this work, in which a page is devoted to each species of Lepidoptera, the descriptions being far superior to those in *Syst. Nat.*, the figure of Edwards is quoted under *protesilaus*!, where it ought to have been quoted also in *Syst. Nat.*

Perhaps the most striking evidence that Linné himself treated the Parsnip Swallowtail as being *ajax* is offered in the 12th edition of *Syst. Nat.* Here the Eastern Palaearctic *P. xuthus* is described on p. 751, being placed after *P. machaon*, while *P. ajax* is placed before *P. machaon*. This *P. xuthus* Linné describes as being **very similar** to *P. ajax* ("simillimus *P. ajaci*"). Now, *P. xuthus* is utterly different from the *Asimina* Swallowtail, while it resembles *P. machaon* as well as the Parsnip Swallowtail.

Considering all this evidence without bias, it appears to us to be beyond doubt

* Namely, *machaon*.

that the name *ajax* "Linné" cannot possibly be employed for the *Asimina* Swallowtail. In our opinion the description under the heading *ajax* was meant for the Swallowtail now called *polyxenes* or *asterius*. But as the description is quite insufficient for precise recognition, and as, further, by the reference to Ray yellow specimens of *Papilio glaucus* are included in the "species *ajax* Linné," we deem it correct to treat the name *ajax* as a synonym of *glaucus*,* which name is described before *ajax*, and to quote it again as a doubtful synonym under *polyxenes*. A change in the names of the North American Swallowtails is thus rendered unnecessary, except that the name *ajax* is dropped altogether, the name *marcellus*, which comes next in priority, and with which everybody is familiar, being employed instead for the species. The wings of *protesilaus* being described by Linné as white, we restrict this name to the white insect figured by Merian and Clerck.

♂♀. Antenna tawny, carinate beneath (except club), the two patches of sensory hairs of each segment being impressed; scaling of upperside usually fallen off, scales of distal segments brown or black, of proximal segments white. Tibiae and tarsi pale green, the former bearing scales in fresh specimens (the scaling may be present also on the tarsi when the specimen emerges from the chrysalis, but we have no information on this point); mid- and hindtibial spurs longer than the tibia is broad.

Forewing with eight pale bands, the third very narrow, not extending beyond cell, fourth and fifth continuous with the discal band, sixth distally of apex of cell, reaching down to R^2 , seventh represented by a spot situated before SC^{4-5} , eighth submarginal, more or less separated into spots, of which the posterior ones are luniform.

Red line of *underside* of hindwing bordered with white proximally, distally of the red line and proximally of white one a black band, the distal black band being the thinner one, the white line situated just outside cell, being contiguous with the cross-veins D^2 . Scales of upper surface nearly all dentate.

Nervation: Praecostal spur of hindwing at three-fourths of basal cellule.

Scent-organ resembling that of *P. protesilaus*, being very different from that of *P. philolaus*; vein SM^3 covered with white scales of the ordinary shape but obliquely truncate at apex, being either more or less dentate or entire; between this vein and abdominal edge of fold a dense covering of thin, white, long hairs, intermixed with a small proportion of much longer and thicker ones; these latter slightly but distinctly widening towards apex, which is rather abruptly narrowed to a point.

Genitalia: ♂. Tenth tergite narrow, slightly-widened distally, divided into three lobes. Dorso-ventral ridge of harpe not extending ventrad beyond the central process, being almost continuous with the non-dentate dorsal edge of the apical lobe of the harpe; central process long, curved ventrad; ventral process triangular. —♀. Walls of vaginal cavity very strongly wrinkled, the wall elevate in front of the vaginal aperture, but there is no sharply separate process or ridge.

Early stages well known. Except in first stage, the segments of the caterpillar bear each six black or brown transverse lines, besides a short line in front and another behind which are connected with one another; the interspaces between lines 2 and 3 and between 4 and 5 very narrow, these lines being usually more or less merged together.—Frontal prominences of chrysalis divergent, carinate above, frons broadly concave between them in dorsal aspect. Thoracic prominence vertical, slightly concave behind, lateral carina continued to cremaster without

* See page 414.

break; puncturation of abdomen rather dense, segments 2 to 8 with transverse carina before apex, tenth segment hardly one-third longer than broad; hooks of cremaster pale.—Food-plant: *Asimina triloba* and other species of *Asimina*, rarely *Ericaceae* and *Lauraceae*.

A seasonally variable species. Two principal forms: a variable spring form emerging from hibernated pupae, and a summer form emerging from pupae which have not wintered. As the size and markings of the specimens appear to depend on the temperature of the period critical for the chrysalis, the late spring specimens approach the summer and autumn specimens, and the early spring individuals from the most southern districts of the range of the species resemble in certain characters the late spring specimens of the more northern districts. The time of appearance in spring varies also with the latitude of the locality.

I. Spring forms.—Hairs on frons long. Pupa hibernated.

a. P. marcellus f. *hib. marcellus* Cram. (1777).

- Papilio Eques Achivus marcellus* Cramer, *Pap. Erot.* ii. p. 4. t. 98. fig. F. G (1777) (Virginia); Stoll, in Cram., *Pap. Erot.* iv., *Ordre Syst.* p. 3. n. 4 (1782) (= *ajax* L., false).
Papilio marcellus Stoll, *Lc.* iv. p. 195 (1782) (= *ajax* L., false).
Papilio ajax, Abbot & Smith, *Lc.*; Boisd. & Lec., *Hist. Gén. Lép. Amér. Sept.* i. p. 4. t. 1. fig. 1—4. l. p. i (1833); Boisd., *Spec. Gén. Lép.* i. p. 258. n. 82 (1836); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 303. n. 206 (1864).
Papilio ajax var. *walshi* Edwards, *Bull. N. Am. i. Pap.* i. fig. 1—5 (1868); id., *Canad. Ent.* iii. p. 70 (1871); Dury, *Cincinnati Soc. Nat. Hist.* i. p. 12 (1878) (Cinc., common).
Papilio ajax var. *walshi* subvar. *abboti* Edwards, *Bull. N. Am. i. Pap.* i. fig. 6 (1868).
Papilio ajax dim. var. *walshi* id., *Trans. Amer. Ent. Soc.* vi. p. 9 (1877) (= *marcellus*).
Papilio ajax sub-var. *abboti* id., *Lc.* (1877).
Papilio ajax var. *abboti*, Gerhard, *Macro-Lep. N. Amer.* p. 25. n. 443c (1878).
Papilio walshi, Mndt, *Canad. Ent.* xv. p. 87 (1883) (Pontiac, Illin., March).
Papilio abboti, id., *Lc.* xv. p. 87 (1883) (Pontiac, Illin., March).
Papilio ajax walshi sub-var. *abboti*, Scudder, *Bull. E. U. St. and Can.* ii. p. 1269 (1889).
Papilio ajax walshi, Eimer, *Arth. Verwandsch. Schmett.* p. 195. t. 3. fig. 12 (1889); Heink, *Ent. News* xiv. p. 335 (1903) (Meramec Highlands, St. Louis Co., April 12).
Papilio ajax var. *abboti*, Holland, *Bull. Book* p. 307 (1899).

The early spring form.

♂ ♀. Pale bands broad; usually no distinct pale band along abdominal fold of hindwing; only tip of tail white; red anal spot large, not divided into spots.

Specimens with some of the red discal spots of the hindwing more or less distinct on upperside are ab. *abboti*.

b. P. marcellus f. *loc. hib. floridensis* Holl. (1899).

Papilio ajax winter form *floridensis* Holland, *Bull. Book* p. 307. t. 44. fig. 2 (1899).

The early spring form of Florida.

♂ ♀. The black bands broader than in f. *hib. marcellus*.

c. P. marcellus gen. *hib. telamonides* Feld. (1864).

- Papilio telamonides* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 303. n. 205 (1864); id., *Reise Novara, Lep.* p. 60. n. 46 (1865); Mndt, *Canad. Ent.* xv. p. 88 (1883) (Pontiac, Illin., later than *walshi*); Pack., *Fifth Rept. U.S. Ent. Comm.* p. 669 (1890) (larva on *Asimina triloba*).
Papilio ajax var. *telamonides*, Edwards, *Bull. N. Am. i. Pap.* ii. fig. 1—8 (1868); Dury, *Cincinnati Soc. Nat. Hist.* i. p. 12 (1878) (Cinc., common).
Papilio ajax dim. var. *telamonides*, Edwards, *Trans. Amer. Ent. Soc.* vi. p. 9 (1877).
Papilio ajax telamonides Eimer, *Arth. Verwandsch. Schm.* p. 195 (1889).
Papilio ajax f. *telamonides*, Moffat, *Canad. Ent.* xxxiv. p. 170 (1902) (Kingsville, Lake Erie, May).

The late spring form.

♂♀. Wings rather longer than in gen. hib. *marcellus*; black bands on the whole a little wider; white colour of tail more extended laterally. Transition to the summer form.

II. Summer and autumn form.—Large; hairs on frons short; wings longer and forewing more falcate than in the spring forms; white colour of tail extending laterally at least to middle.—Only one form, the various broods not appearing to differ from one another.

d. P. marcellus f. aest. *lecontei* nom. nov.

Papilio marcellus, Boisduval & Leconte (non Cramer, 1777, err. det.); *Hist. Gén. Léop. Amér. Sept.* i. p. 8. t. 2. fig. 1—4. l. p. i (1833); Boisd., *Spec. Gén. Léop.* i. p. 257. n. 81 (1836); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 303. n. 204 (1864).

Papilio ajax var. *marcellus*, Edwards, *Butt. N. Am.* i. *Pap.* iii. fig. 1—6 (1868).

Papilio ajax dim. var. *marcellus*, id., *Trans. Amer. Ent. Soc.* vi. p. 9 (1877).

Papilio ajax var. *marcellus*, Dury, *Cincinnati Soc. Nat. Hist.* i. p. 12 (1878) (Cinc., common).

Papilio ajax marcellus Eimer, *Arb. Verwandtsch. Schm.* p. 195. t. 4. fig. 5 (1889).

Iphiclides ajax ajax, Scudder, *Butt. East U. St. & Can.* ii. p. 1264. t. 15. fig. 11 (1889).

There is no valid name available for this form, which was erroneously figured by Boisduval and Leconte as the true *marcellus* of Cramer. We do not know what nomenclatorial considerations induced W. H. Edwards to rename the early spring form as *walshi*, sinking *marcellus* Cram. as a synonym of *walshi*, and to employ *marcellus* Boisd. & Lec. (1834; non Cramer, 1779) for the summer form. Scudder correctly referred to the early spring form as *marcellus* Cram.

♂♀. Black bands of body and wings broader than in the spring forms; hindwing usually with distinct pale band along abdominal fold, second red spot of upperside much reduced, in male very often, in female always, absent.

Name-type of *lecontei* from Nashville.

Hab. *P. marcellus* occurs from Florida and Texas to southern Canada, westwards extending to the Mississippi plains; in the northern districts it is more a visitor than a resident.

One specimen found on Vancouver Island; chrysalis imported (?).

In the Tring Museum 120-odd specimens, and several larvae and pupae from: Nashville, Tennessee (W. Osburn); Jefferson Co., Kentucky (C. Troxler); Nelson Co., W. Virginia (Wirt Robinson); Sanford, Florida.

139. *Papilio marcellinus* Doubl. (1845).

Sloane, *Voy. Jamaica* ii. p. 218. t. 239. fig. 17. 18 (1725).

Papilio Eques Achirus protesilaus Linné, *Mus. Lud. Ulr.* p. 209. n. 28 (1764) (sub citat.: "Sloane. *jam.* 2. p. 218. t. 239. f. 17, 18"); Drury, *Illustr. Ecot. Ins.* i. p. 45. (and Index) t. 22. fig. 3. 4 (1770) (Jamaica).

Papilio Eques Achirus sinou Fabricius (non Poda, 1761), *Syst. Ent.* p. 452. n. 39 (1775) (*partim*; "India"); id., *Spec. Ins.* ii. p. 15. n. 59 (1781) (*partim*); Goeze, *Ent. Beytr.* iii. 1. p. 72. n. 7 (1779) (*partim*); Cram., *Pap. Exot.* iv. p. 57. t. 317. fig. C. D (1780) ("Jamaica"; syn. excl.); Fabr., *Mant. Ins.* ii. p. 8. n. 67 (1787) (*partim*); Gmel., *Syst. Nat.* i. 5. p. 2241. n. 329 (1790) (*partim*); Fabr., *Ent. Syst.* iii. 1. p. 26. n. 75 (1793) (*partim*; "India").

Papilio sinou Fabricius, *Nomencl.* p. 128 (1797) ("India"); Godart, *Enc. Méth.* ix. p. 53. n. 80 (1819) (*partim*); Boisd. & Lec., *Hist. Gén. Léop. Amér. Sept.* p. 11 (1833) (*partim*); Boisd., *Spec. Gén. Léop.* i. p. 260. n. 83 (1836) (*partim*); Morris, *Syn. Lep. N. Am.* p. 9. n. 13 (1862) (*partim*; sub synonym.); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 302. n. 209 (1864) (*partim*); Butl., *Cat. Diurn. Lep. descr. Fabr.* p. 240. n. 25 (1869) (Jamaica; type in coll. Banks); Kirby, *Cat. Diurn. Lep.* p. 557. n. 269 (1871) (Jamaica); Butl., *Proc. Zool. Soc. Lond.* p. 481.

n. 34 (1878) (Jamaica); Möschl., *Abh. Senkenb. Nat. Ges.* xiv. *Schm. Jamaica* p. 26. n. 1 (1888); Eimer, *Arth. Verwandtsch. Schm.* p. 183. t. 3. fig. 11 (1889) (Jamaica); id., *Orthogen.* pp. 44. 131. 139. 305 (1897) (Jamaica).

Iphiclides sinon, Hübner, *Verz. bek. Schm.* p. 82. n. 838 (1818?) (*partim*).

Papilio marcellinus Doubleday, *List Lep. Ins. Brit. Mus.* i. p. 8 (1845) (*nom. nov. loco protesilaus* Drury; Jamaica); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 15. n. 131 (1846) (Jamaica); Gray, *Cat. Lep. Ins. Brit. Mus.* i. p. 32. n. 152 (1852) (Jamaica); id., *List Lep. Ins. Brit. Mus.* i. p. 44. n. 160 (1856) (Jamaica); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 303. n. 203 (1864) (Jamaica); Oberth., *Et. d'Ent.* iv. p. 65. n. 172 (1880) (Jamaica).

♂♀. Abdominal tergites edged with white, the white edge incomplete above. Tibiae and tarsi pale green, tarsal segments somewhat ochraceous at apices; no scaling; external spur of mid- and hindtibiae a little longer than internal.

Wings, *upperside*, with pale green bands; scales nearly all denticulate, those of the pale markings small, comparatively few in number, easily falling off, leaving the bands naked.—Forewing: a basal and a subbasal band from costal to inner margin, a very thin line across cell just proximally of M², a broad band beyond middle of cell, divided costally by a black line or spot, the band continuous with a broad discal band; a short costal band SC²—R¹ proximally of subcostal fork; a row of seven submarginal spots, there being no spot or only a trace of one behind M².—Hindwing: black submedian band complete, reaching to black distal border.

Pale bands of *underside* scaled, the scales smaller than the brown ones on forewing. Red line of hindwing very broad, reaching to brown distal border of wing, the line edged with black distally, especially in costal region, thinly edged with black proximally.

Scent-organ: Fold small, scent-scales long, similar to those of *agesilaus*, but longer and more slender.

Genitalia: ♂. Tenth tergite elongate but broad, divided apically by two narrow incisions into three lobes. Dorsal-ventral ridge of harpe reaching ventral edge about middle, ending dorsally in an acute, somewhat conical process or tooth; ventral process short but distinct.—♀ not dissected.

Early stages and food-plant not known.

As Poda gave the name *sinon* in 1761 to the European *P. podalirius*, which belongs also to the present section of *Papilio*, the same name cannot be employed for the Jamaican insect. Doubleday was quite right in renaming the species.

Hab. Jamaica.

In the Tring Museum 6 ♂♂ from: S. Thomas, Jamaica, May 1892 (Taylor); "Jamaica."

Several pairs in coll. Oberthür.

140. *Papilio celadon* Lucas (1852).

Seba, *Thesaur.* iv. p. 45. t. 37. fig. 13. 14 (1764).

Papilio Eques Achivus sinon Cramer (*non* Poda, 1761; *non* Cramer, fig. C. D.), *Pap. Erot.* iv. p. 57. t. 317. fig. E F (1780); Fabricius, *Mant. Ins.* ii. p. 8. n. 67 (1787) (*partim*); Jabl. & Herbst, *Naturs. Schm.* iii. p. 159. n. 101. t. 44. fig. 5 (1788) (*partim*; fig. copy of Cramer's fig. E); Gmelin, *Syst. Nat.* i. 5. p. 2241. n. 329 (1790) (*partim*; "India" !); Fabr., *Ent. Syst.* iii. 1. p. 26. n. 75 (1793) (*partim*; "India" !).

Papilio sinon, Godart, *Enc. Méth.* ix. p. 53. n. 80 (1819) (*partim*); Boisd. & Lec., *Hist. Gén. Lép. Amér. Sept.* p. 11 (1833) (*partim*); Boisd., *Spec. Gén. Lép.* i. p. 260. n. 83 (1836) (*partim*); Duncan, in *Jard., Nat. Libr., Ent.* v. p. 106. t. 4. fig. 2 (1843) (*syn. partim*); Poey, *Mem. Real Soc. Econ. Habana* p. 236 (1846); Ménétr., *Enum. Corp. Anim. Mus. Petr., Lép.* i. p. 3. n. 45 (1857) (*partim*); Herr.-Sch., *Corresp. Bl. Zool. Min. Ver. Regensb.* p. 172. n. 2 (1864) (Cuba); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 302. n. 200 (1864) (*partim*); Edw., *Trans. Amer. Ent. Soc.* vi. p. 9. n. 2

- (1877) (Florida, occasionally Cuba) ; Gerh., *Macro-Lep. N. Amer.* p. 25. n. 442 (1878) (Florida) ; Strecker, *Butt. Moths N. Amer.* p. 68. n. 6 (1878) (Florida ? ; Antilles ; *partim*).
Iphielides sinon, Hübner, *Verz. bek. Schm.* p. 82. n. 838 (1818 ?) (*partim*).
Papilio celadon Lucas, *Rev. Zool.* (2). iv. p. 130 (1852) (" Amer. Sept.") ; Doubl., Westw. & Hew., *Gen. Diurn. Lep.* ii. p. 529 (1852) (" N. America ") ; Gray, *Cat. Lep. Ins. Brit. Mus.* i. p. 31. n. 153 (1852) (" N. America ") ; id., *List Lep. Ins. Brit. Mus.* i. p. 41. n. 161 (1856) (" N. America ") ; Lucas, in Sagra, *Hist. Fis. Cuba* vii. p. 204 (1857) (Cuba) ; Morris, *Syn. Lep. N. Am.* p. 10. n. 14 (1862) (" California—Oregon ?," error) ; Weidem., *Proc. Ent. Soc. Philad.* ii. p. 146 (1863) (= *sinon* = *marcellinus*, error) ; Felder, *l.c.* xiv. p. 303. n. 202 (1864) (*partim*) ; Kirby, *Cat. Diurn. Lep.* p. 557. n. 268 (1871) (" Antilles ") ; Oberth., *Et. d'Ét.* iv. p. 65. n. 173 (1880) (Cuba) ; Gündl., *Papilio* i. p. 113 (1881) (Cuba) ; id., *Contr. Ent. Cubana* p. 125 (1881) (Cuba) ; Eimer, *Arb. Verw. Schm.* p. 182. t. 3. fig. 10 (1889) (Cuba) ; id., *Orthogen.* p. 44. 131. 305 (1897) (Cuba).
Papilio serion (?), Edwards, *Canad. Ent.* xiv. p. 120 (1882) (Cuba, perhaps also Florida).
Iphielides celadon, Kirby, in Allen's *Nat. Libr., Lep. Butt.* ii. p. 274. t. 68. fig. 2. (1896) (Cuba ; " Jamaica," errore).

♂ ♀. Though in general aspect not unlike *P. marcellinus*, there are very important differences, of which we mention the following : On the forewing it is the third and fourth pale green cell-bands (instead of the fourth and fifth) which are continuous with the discal band ; these two cell-bands narrowing costad, separated by a black band which usually extends to M ; a pale green cell-band close to apex of cell, widely separate from the discal band ; fifth submarginal spot enlarged and, like the second, somewhat more proximal than the others. Red line of hindwing below thin, bordered with black on both sides, the red scaling not extending beyond cell, often restricted to costal region, the line and its borders continued to the brown distal area as a brown band.

Neuration : Cell of hindwing broader apically than in *P. marcellinus*, veins R², R³ and M¹ being less close together and the apical angle less acute.

Genitalia : ♂. Tenth tergite long, narrow, slightly compressed, rodlike in dorsal aspect, a little curved downwards, tip acute, with a very feeble notch at each side indicating the lateral lobes of the allied species. Apical lobe of harpe much larger than in *P. marcellinus* ; ventral process absent ; dorso-ventral ridge not ending dorsally in a tooth or process.—♀. Within vaginal cavity, at the proximal side of the orifice, a tubercle which is mesially channelled ; at each side of the vaginal orifice, but a little farther back, a deep impression, the two grooves being separated in consequence of the mesial portion of the segment being non-depressed ; there are some long bristles on this mesial part, doubtless of sensory function. Anal segment with some short stout spines.

Early stages and food-plant not known.

Fresh specimens are pale bluish green, which colour fades, by exposure, into greenish white or yellowish green.

Hab. Cuba ; probably also in Florida.

There is no authentic record of this insect from Florida ; but the species may be expected to occur in southern Florida, like so many Cuban insects.

In the Tring Museum 8 ♂♂, 7 ♀♀, from : Holquin and Gibara, January and April—May 1904 (Tollin) ; Cotorro.

141. *Papilio zonaria* Butl. (1869).

Aubenton, *Planch. Eulum.* i. t. 18. fig. 1. 2 (1765).

- Papilio Eques Achirus sinon* Fabricius (*non* Poda, 1761), *Syst. Ent.* p. 452. n. 39 (1775) (*partim* ; " India ") ; id., *Spec. Ins.* ii. p. 15. n. 59 (1781) (*partim*) ; Goetz, *Ent. Beytr.* iii. 1. p. 72. n. 7 (1779) (*partim*) ; Fabr., *Mant. Ins.* ii. p. 8. n. 67 (1787) (*partim*) ; Jabl. & Herbst, *Naturs.*

- Schn.* iii. p. 159. n. 101. t. 44. fig. 6 (1788) (*partim*; fig. is copy of Anbent's fig. 2); Gmelin, *Syst. Nat.* i. 5. p. 2241. n. 329 (1790) (*partim*; "India"); Fabr., *Ent. Syst.* iii. 1. p. 26. n. 75 (1793) (*partim*; "India").
- Papilio sinou*, Godart, *Eur. Méth.* ix. p. 53. n. 80 (1819) (*partim*); Boisd. & Lec., *Hist. Gén. Léop. Amer. Sept.* p. 11. t. 3. fig. 1. 2 (1833) (*partim*; "Florida," error?); Boisd., *Spec. Gén.* i. p. 260. n. 83 (1836) (*partim*); Doubl., in Westw., *Arc. Ent.* i. p. 60 (1845) (not the same as Drury's *protes.*); Gray, *Cat. Lep. Ins. Brit. Mus.* i. p. 32. n. 151 (1852) ("N. Amer. & Jamaica"); id., *List Lep. Ins. Brit. Mus.* i. p. 43. n. 159 (1856) (St. Domingo; *synon. partim*); Lucas, in Sagra, *Hist. Fis. Cuba* vii. p. 204 (1857) ("Cuba, Jamaica, Florida," error); Ménétr., *Enum. Corp. Anim. Mus. Petr., Léop.* i. p. 3. n. 45 (1857) (*partim*); Morris, *Syn. Lep. N. Am.* p. 9. n. 13 (1862) (*synon. partim*; "Southern States"); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 302. n. 200 (1864) (*partim*); Oberth., *Et. d'Ent.* iv. p. 65. n. 171 (1880) (S. Domingo).
- Iphielides sinou*, Hübner, *Verz. bek. Schu.* p. 82. n. 838 (1818?) (*partim*); Dyar, *Bull. U. St. Nat. Mus.* lii. p. 2. n. 6 (1902) (*partim*).
- Papilio zonaria* Butler, *Cat. Diurn. Lep. descr. Fabr.* p. 240. n. 24 (1869) (San Domingo); id., *Ent. Mo. Mag.* v. p. 271. n. 3 (1869) (S. Domingo); Kirby, *Cat. Diurn. Lep.* p. 557. n. 267 (1871) (*partim*); Gerh., *Macro-Lep. N. Amer.* p. 25. n. 441 (1878) ("Unio!"); Eimer, *Arb. Verwandtsch. Schneit.* p. 186 (1889) ("Jamaica," errore).
- Papilio celadon*, Weidemeyer, *Proc. Ent. Soc. Philad.* ii. p. 146 (1863) (= *sinou* = *marcellinus*, errore).
- Papilio zonaria* = *serion* (?), Edwards, *Canad. Ent.* xiv. p. 120 (1882) ("Cuba," errore).

♂ ♀. Closely related to *P. marcellinus*; in aspect similar to *P. philolaus* in consequence of the reduction in width of the pale bands. On forewing the fourth and fifth pale green cell-bands continuous with the narrow discal band, third cell-band thin, as in *P. marcellinus*, but a little more distal in position, fourth and fifth bands much thinner than in *P. marcellinus*, much more distal and completely separate from one another; a small pale dot distally of short sixth band. Red line of underside of hindwing bordered with black on both sides, reaching to brown distal area or nearly.

Scent-organ and neuration essentially as in *P. marcellinus*.

Genitalia as in *P. marcellinus*, but apical lobe of harpe longer and more evenly rounded.

Early stages not known.

Hab. Haiti.

The early records of this insect from Florida, Cuba, or Jamaica are not authentic; *marcellinus* and *celadon* were doubtless confounded with *zonaria*. All the specimens of *zonaria* which we have seen were from the island of San Domingo (Haiti).

If a representative of this group occurs on Porto Rico, it is most likely *zonaria* or a form closely allied to it.

In the Tring Museum 1 ♂.

In coll. Oberthür 5 ♂♂, 1 ♀; also a small series in coll. F. D. Godman.

142. *Papilio philolaus* Boisd. (1836).

- Papilio philolaus* Boisduval, *Spec. Gén. Léop.* i. p. 256. n. 80 (1836) (Mexico); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 8 (1845) (Oaxaca); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 15. n. 129 (1846) (Mexico); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 33. n. 154 (1852) (Mexico); id., *List Lep. Ins. Brit. Mus.* i. p. 44. n. 162 (1856) (Mexico; Nicaragua); Ménétr., *Enum. Corp. Anim. Mus. Petr., Léop.* i. *Suppl.* p. 68. n. 1121 (1857) (Mexico); id., *l.c.* iii. p. 110. n. 1121. t. 7. fig. 1 (1863) ("Amer. Sept.," errore); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 303. n. 201 (1864) (Mexico; Nicaragua; "Amer. Sept.," errore); Boisd., *Cons. Léop. Guat.* p. 6 (1870) (Honduras; Mexico); Kirby, *Cat. Diurn. Lep.* p. 557. n. 266 (1871) (Amer. centr.; "Amer. bor.," errore); Gerh., *Macro-Lep. N. Amer.* p. 25. n. 440 (1878); Oberth., *Et. d'Ent.* iv. p. 65. n. 174 (1880) (Mexico); Stand., *Exot. Taqf.* i. p. 18. t. 12. ♂ (1884) (Guatemala; Mexico); Eimer, *Arb. Verwandtsch.*

- Schmett.* p. 210. t. 4. fig. 1. 7 (1889); *Godm. & Salv., Biol. Centr. Amer., Rhop.* p. 220. n. 49. t. 68. fig. 12. harpe (1890) (Mexico: Guatemala; Brit. Honduras; Honduras; Nicaragua); *Eimer, Orthogen.* p. 400 (1897) ("Nord Amer.," errore; Mittel Amer.).
- Papilio xanticles*, *Rogenhofer, in Staud., Exot. Tagf.* i. p. 305 (1888).
- Papilio philolaus ajae* *Eimer (non Linné, 1758), Arb. Verwandsch. Schmett.* p. 212. t. 4. fig. 1 (1889) (Mexico).
- Papilio philolaus nigrescens* *id. (non id., 1889, podulirius nigrescens), l.c.* p. 213 (1889) (Honduras).
- Papilio philolaus niger* *id., l.c.* 214 (1889) (Honduras).
- Papilio philolaus ab. felicitis* *Fruhstorfer, Soc. Ent.* p. 25 (1904) (Honduras).

♂ ♀. Antenna black, more or less feebly tawny at base. Tibiae and tarsi pale green, tarsal segments slightly ochraceous at apex; mid- and hindtibial spurs about as long as the tibia is broad, the spurs being shorter than in *P. marcellus*; claw also shorter than in that species. Seventh pale band of forewing represented by a spot SC³—SC⁴⁻⁵, there being often some pale scales costally of this spot; hindwing above with two red spots between M¹ and abdominal margin, black median band running across apex of cell, being contiguous with the oblique cross-vein D², very seldom slightly separate from this vein, this band not interrupted, always extending to the black distal area.

On underside the red median line of hindwing is bordered with black on both sides, at least costally; it is undulate costally and is always contiguous with cross-vein D². The praecostal vein stands close to the apex of the basal cellule; the apical angle of the cell of the hindwing is acute, D² being very oblique; D³ is short, being about one-fourth the length of D²; D³ and D⁴ are together shorter than D². The scales of the upperside, apart from the anal area and the tail, are nearly all entire.

Scent-organ: scent-scales short, with numerous long filaments, the shape of the scales and the number of filaments being variable.

Genitalia: ♂. Dorsal ridge of harpe reaching ventral edge nearly in middle.—♀. A deeply sinuate lobe in front of vaginal cavity, the lobe plicate; laterally of cavity a larger lobe of which the edge is simply convex.

Early stages not known.

The species does not vary geographically, but there is considerable individual variability, especially in the width of the bands. The red markings of the hindwing are occasionally pinkish yellow (a male from San Pedro Sula in Mus. Tring). The third pale line of the forewing is often washed over with black, the line being sometimes distinct only near the costal margin; the second pale line is also reduced in length in some specimens. The sixth pale band is rarely so much prolonged as to nearly extend to the discal band. The latter is usually very much narrower than the black band situated between it and the submarginal row of greenish spots, but there occur also specimens in which the greenish white band is wider between M¹ and hinder margin than the black band situated distally of it. The submarginal spots of both the fore- and hindwing are largest in the specimens with wide discal band, the last of the forewing and the first and last of the hindwing being often vestigial in individuals with narrow pale bands. The specimens with broad pale bands are a little more short-winged than the darker specimens, the forewing being on the whole also less falcate. As these differences are somewhat similar to those observed between the seasonal varieties of the North American *P. marcellus*, it is possible that the dark and the pale specimens of *P. philolaus* belong to different broods; but no observations have been made towards this point. The pale band along the abdominal margin of the underside of the hindwing is

often somewhat washed with red, reminding one of the corresponding red line of *P. asius*.

The female is dichromatic.

a. ♀-f. *philolaus* Boisd. (1836) is similar to the male, differing especially in the underside being paler. The vestige of a pale postdiscal band on the under-surface of the forewing is on the whole more distinctly marked than in the male.

b. ♀-f. *niger* Eimer (1889) (= *felicis* Fruhst., *l.c.*) has lost all the pale bands, the row of submarginal spots being however more or less distinct. The red markings of the hindwing are also preserved. The black surface of the wings has not been attained by a widening of the black bands, but by the pale bands being washed over with black, these bands remaining as faint shadows. It is the same development which we observe in the African *P. illyris* and *kirbyi*, and the North American *P. glaucus glaucus* ♀-f. *glaucus*.

Hab. of *P. philolaus*: Mexico to Nicaragua and Honduras.

In the Tring Museum 55 ♂♂, 7 ♀♀, from: Sangoleica, June 1897, Espinal, June 1896, Vera Cruz (W. Schaus); Guerrero (O. T. Baron); Guatemala (Salvin); San Pedro Sula, Honduras.

Ménétriés, when describing and figuring this species, *l.c.*, gave North America as the country where Motschoulsky had obtained the specimens, and since then several authors (Felder, Kirby, Eimer) have included "Amer. Sept." in the range of the species. However, the species does not occur north of Mexico. In the list of 1857 Ménétriés correctly gave Mexico as habitat.

143. *Papilio xanticles* Bates (1863).

Papilio xanticles Bates, *Proc. Zool. Soc. Lond.* p. 241. n. 1. t. 29. fig. 3 (1863) (Panama); Felder, *Vrbh. Zool. Bot. Ges. Wien* xiv. p. 302. n. 199 (1861) ("Guatemala," false); Kirby, *Cat. Diurn. Lep.* p. 557. n. 265 (1871) (Panama); Oberth., *Et. d'Ent. iv.* p. 67. n. 186 (1880) (Panama); Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 126. n. 234 (1880) (Manauze, Sta. Marta); Eimer, *Arb. Verwundtsch. Schmett.* p. 178. fig. U (1889); Godm. & Salv., *Biol. Centr. Amer., Rhop.* p. 221. n. 50. t. 68. fig. 10. ♀, 11. ♂ (1890) (Lion Hill, Panama; Colombia).

Papilio plusioides Staudinger, *Exot. Tuff.* i. p. 17 (1884) (Sta. Martha); Eimer, *l.c.* p. 182 (1889) (var. of *arcesilaus*, errore).

♂♀. Pale bands of *upperside* of wings buffish straw-yellow; the cell-bands of forewing rather wider than in *P. philolaus*, sixth pale band extending to R² where it joins the discal band, the latter continued costad to SC³, the single spot SC²—SC⁴ of *P. philolaus* being replaced in *P. xanticles* by a band which is continuous with the broad discal band, being the direct prolongation of the same.—Black subbasal band of hindwing much thinner than in *P. philolaus*; black median band widely interrupted; red anal spots smaller than in *P. philolaus*; submarginal spots larger.

On *underside*, position of red line of hindwing as in *P. philolaus*, central portion of line thin. Pale streaks on abdomen broader than in *P. philolaus*.

The species does not vary much. The ♀, however, appears to be dimorphic as in *philolaus*:

a. ♀-f. *xanticles* Bates (1863) similar to the ♂. This form is not known, but doubtless exists.

b. ♀-f. *scheba* nov., wings black, except a row of yellowish submarginal spots and two red anal spots.

Though somewhat resembling in colour *P. arcesilaus*, of which it has generally been considered a near ally, *P. xanticles* is in fact hardly more than a southern

form of *P. philolaus*. There is no structural difference between *P. xanticles* and *philolaus*, *xanticles* having all the peculiarities in the structure of the scent-organ, the genitalia and legs which we have mentioned under *P. philolaus*. In pattern the two insects are well separated. However, we must bear in mind that, *P. philolaus* being known to occur as far south as Nicaragua, and *xanticles* having been found only in Colombia and Panama, there is a geographical gap between the two *Papilio*s, where possibly an intermediate form exists which has as yet escaped observation.

The fact that the extended-black *P. philolaus* and the much less extended-black *P. xanticles* are two closely related species, if they are not geographical varieties of one species, appears to us to upset one of those "laws" of development established on insufficient evidence by Eimer and accepted by others. In *Orthogenesis*, p. 401, Eimer comparing the characters of *philolaus* with those of the various seasonal forms of *marcellus* (*ajax*, auct. non Linné) comes to the conclusion that the black bands of *philolaus* are strongly developed **because** *philolaus* is a more southern insect than *marcellus*. However, if high temperature and moisture, as Eimer says, were the real causes which have turned the less extended-black ancestral *philolaus* into the extended-black present-day *philolaus*, then the ally of *philolaus* which lives in a hotter and more moist climate than *philolaus* itself, ought to be more extended-black than *philolaus*. We find, on the contrary, that *P. xanticles* from the coast of Panama and the north coast of Colombia is far less black than *philolaus* from Nicaragua and the countries northwards, inclusive of Mexico, and even than the North American *marcellus*.

Eimer makes another mistake when talking of the lines of development of *P. philolaus* and *P. marcellus*. He calls the black form of *philolaus*—Eimer did not know that this black form is restricted to the female sex—as being arrived at by extension of the black bands. That is not correct. The pale bands have **not** become narrower and narrower until they finally disappeared, but the pale bands have become suppressed by the scaling turning black. This assumption of black colour on the part of the scales of the pale bands is a new kind of development (see *P. ph. ♀-f. niger*), the black wing of these females being not at all the final result of *Orthogenesis*, i.e. of a gradual widening of the black bands.

The *Papilio plaesiolaus* Stand. (1884), which is the same as *xanticles*, is treated by Eimer, *l.c.*, as being a variety of *arcesilaus*, a very different species. However, Eimer knew *xanticles* only from Bates's figure and description, and *plaesiolaus* from Staudinger's description.

In the Tring Museum 8 ♂♂ from Panama.

In coll. F. D. Godman a series of males and the only known female. One of the males, from Manaure, S. Martha, has the yellow discal areas of both wings and the submarginal spots of the forewing enlarged.

144. *Papilio oberthueri* spec. nov. (Pl. VI. fig. 25).

♂. Body, antenna, and legs essentially as in *P. philolaus*.

Wings, *apperside*: less deep black than in *P. philolaus*, the scales nearly all mi- or bisinuate.—Forewing semitransparent distally, pale bands white, proximal ones greenish, submarginal spots also greenish; these bands broader than in *P. philolaus*; second pale band about two-thirds the width of the black band situated distally of it, sixth band extending to R², being separated from the white discal area only by the black vein R², costally a little more distal in position than in

philolaus; spot SC³—SC⁴ as in *philolaus*, white discal area about half as wide again at M² as the black distal area; third black cell-band extending a very little beyond M, there being only a small black dot at the base of cellule M¹—M²; upper submarginal spots larger than in *philolaus*, the posterior ones vestigial.—Hindwing narrower than in *philolaus*; black median band stopping at cell, not reaching across apex of cell as is the case in *philolaus*; black distal area a little paler than in *philolaus*, narrower, veins R², R³, and M¹ thinly black; upper submarginal spot vestigial, the others more or less washed with black.

Underside: black bands somewhat paler than in *philolaus*.—Forewing: last submarginal spot more or less vestigial; black dot at base of cellule M¹—M² very small or absent.—Hindwing: black subbasal band narrower than in *philolaus*; red line not undulate, crossing cell between M¹ and R³ or at M¹, the posterior portion of the line more or less vestigial, 2 or 3 mm. distant from apex of cell; the line bordered with black distally and very feebly or not at all proximally; two red anal spots as in *philolaus*; submarginal spots less distinct than in *philolaus*, especially the upper ones.

Neuration: cell of hindwing much less acute at apex than in *philolaus*, M¹ less close to R³, and D² less oblique; praecostal spur more proximal.

Scent-organ: scales longer than in *philolaus*, the lateral filaments shorter.

Genitalia similar to those of *P. philolaus*.

Hab. San Pedro Sula, Honduras (Wittkugel); 3 ♂♂ in coll. Charles Oberthür.

145. *Papilio arcesilaus* Lucas (1852).

Papilio arcesilaus Lucas, *Rev. Zool.* p. 131. t. 10. fig. 2 (1852) ("Amér. du Nord" errore;—coll. Oberthür); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* ii. p. 529 (1852) ("North America," errore); Gray, *Cat. Lep. Ins. Brit. Mus.* i. p. 33. n. 155 (1852) ("N. America"); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 45. n. 164 (1856) ("N. America"); Morris, *Syn. Lep. N. Am.* p. 11. n. 15 (1862) ("California—Oregon?", errore); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 146 (1863) ("U.S.A." errore); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 302. n. 197 (1864) (Caracas); id., *Reise Novara, Lep.* p. 60. sub n. 45 (1865) (Venezuela); Kirby, *Cat. Diurn. Lep.* p. 557. n. 264 (1871) (Venezuela); Oberth., *Et. d'Ent.* iv. p. 65. n. 175 (1880) (Colombia; Valera, Venezuela); Staud., *Exot. Tagf.* i. p. 16. t. 11. ♂ (1884) (Valera, Venezuela; ♀, Caracas); Eimer, *Arth. Verwandtsch. Schmett.* p. 179. t. 3. fig. 9 (1889) (Venezuela; Bogota); Hahnel, *Iris* iii. p. 200. 203 (1890) (Valéra); Eimer, *Orthogeu.* p. 44 (1897).

Papilio anaxilaus Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 302. n. 198 (1864) (Bogota); Godm. & Salv., *Trans. Ent. Soc. Lond.* p. 126. n. 233 (1880) (Sta. Marta); Staud., *Exot. Tagf.* i. p. 17 (1884) (Antioquia, Colombia).

Papilio arcesilaus var. a. *P. anaxilaus*, Kirby, *l.c.* (1871) (Bogota).

Papilio arcesilaus-anaxilaus, Eimer, *Arth. Verwandtsch. Schmett.* p. 181 (1889) (Colombia).

♂♀. Antenna black, beneath slightly tawny proximally; scaling of upperside black. Tibiae and tarsi pale green, not scaled, or only a very few scales present; mid- and hindtibial spurs as long as the tibia is broad, outer spur a little shorter than inner.

Wings, *upperside*: scales nearly all entire, apart from tail and anal area. Forewings: six greenish white bands and a row of submarginal spots, sixth band short, reaching only to R¹ or R², being separate from the greenish white discal area.—Hindwing: black median line marked only costally, sometimes vestigial.

Red median line of *underside* of hindwing reaching to blackish brown distal band, contiguous with cross-veins D¹ and D², there being no white spot in apex of cell outside the red line or only a trace of such a spot; the line bordered with black on both sides costally, especially on the proximal side.

Scent-organ : scales similar to those of *P. agesilaus*.

Genitalia : ♂. Harpe resembling that of *P. philolaus*, dentition slightly different, proximal edge of central process subdentate, ventral process vestigial. The three lobes of tenth tergite a little longer.—♀ not dissected.

Early stages not known.

The species does not vary much. The fourth black band of the forewing reaches usually to the median vein, but is often narrowed behind or abbreviated. The submarginal spots of the forewing vary in size and distinctness, the whole series being sometimes more or less washed with black. In a male from Venezuela, in coll. Godman, the cell-bands of the forewing are washed over with black. The single Colombian specimen in the Felder collection differs rather obviously from the only Venezuelan individual which Dr. Felder had for comparison when he described the former specimen as belonging to another species, which he named *anaxilaus*. The differences are, however, not constant. The small series of Colombian specimens which we have seen proves that the individuals vary *inter se*.

Hab. Venezuela and Colombia.

In the Tring Museum 6 ♂♂ from : Valera ; "Venezuela" (Moritz) ; Bogota.

146. *Papilio epidaus* Doubl. (1846).

Papilio epidaus Doubleday, in Doubleday, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 15. n. 133. t. 3. fig. 1 (1846) (Mexico ; Honduras).

♂ ♀. Antenna black, occasionally brown at the apex of the segments ; scaling black, usually fallen off. Tibiae and tarsi pale green ; mid- and hindtibial spurs about as long as the tibia is broad, inner one a little longer than outer.

Scaling of wings peculiar. Forewing, *upperside* : black bands densely scaled, scales dentate, those of marginal band somewhat narrower than the scales of the other bands ; the white scales all very narrow, sinuate, distant from each other, therefore the wing more or less transparent, the hinder portion, however, appearing opaque owing to the denser white scaling of the undersurface shining through. If the wing is looked at in a slanting position, the eye being between light and specimen, a broad elongate-triangular band situated between distal margin and cell appears transparent, while the rest of the wing is more or less white, apart from the black bands ; this transparent band is covered with minute black scales on the upperside, being quite naked on the underside. The homology of this band is easy to perceive, the band corresponding to the postdiscal band of *P. agesilaus*, which is a double one ; the pale line which divides this postdiscal band of *P. agesilaus* (most distinctly in *P. agesilaus autosilaus*) is represented in *P. epidaus* by a white costal spot. The external edge of the transparent band of *P. epidaus* is usually more densely scaled than the centre, at least at the costal margin, forming a black proximal border to the white submarginal band, the border extending often down to M². The proximal portion of the postdiscal band of *P. agesilaus* is in *P. epidaus* represented by a black costal spot situated proximally of the subcostal fork, and by a black band which runs from the lower angle of the cell towards the hinder angle of the wing, being a direct continuation of the discocellular band. The subapical cell-band is represented by a costal spot in most specimens, there being from this spot across the cell a faint band of dispersed minute black scales ; occasionally the band is distinct as far as middle of cell. Most of the scales in the costal and central area of the hindwing are entire.

The transparent spaces of the *underside* of the forewing are practically devoid of scales; the white scales of the posterior area are entire. The scales of the hindwing are dentate, except at the abdominal margin and between the subbasal and median bands.

Markings very characteristic. Second band of forewing reaching hinder margin beyond middle, discocellular band continued to M^2 or hinder angle, as explained above. Abdominal edge of hindwing black; subbasal band heavy, continued to anal spot; median band complete or posteriorly vestigial on *upperside*, bordering cell, on *underside* the band bordered with black proximally down to anal spots, its distal black border either being restricted to the costal region, or being thinner than the proximal border, at least from SC^2 to R^2 .

Nervation: lower angle of cell of forewing obtuse; cell of hindwing broad, widest at origin of nervule SC^2 ; D^1 and D^2 variable, sometimes nearly the same in length, sometimes D^1 almost twice the length of D^2 ; D^3 always very short; D^1 about half or two-thirds the length of D^2 ; praecostal spur elbowed, not evenly curved.

Scent-organ: fold small; scent-scales nearly as in *P. agesilaus*.

Genitalia: ♂. Tenth tergite trilobate as in *P. agesilaus*; harpe strongly elevate where the dorso-ventral ridge meets the ventral edge, apical lobe broadly rounded, short.—♀. A small, feebly chitinised tubercle at the proximal side of the vaginal orifice; behind the orifice, laterally on each side, a deep large groove, the walls of which are rather strongly chitinised; anal segment with numerous very short spines.

Early stages not known.

Hab. Central America: Mexico to Honduras; Nicaragua (according to Ménétrés).

Butler and Druce record it from Costa Rica. The record is certainly erroneous. This specimen is in the Godman collection. It agrees with *P. epidaus epidaus*, which would hardly be the case if the specimen came from Costa Rica. The record from Nicaragua, though requiring confirmation, may be correct, since Nicaragua belongs to the northern faunistic district of Central America.

Three subspecies.

a. P. epidaus epidaus Doubl. (1846).

Papilio epidaus Doubleday, in Doubl., Westw. & Hew., *l.c.* p. 15. n. 138. t. 3. fig. 1 (1846) (Mexico; Honduras); id., *List Lep. Ins. Brit. Mus.* i. *App.* p. 2 (1848) (Honduras; Yucatan); Gray, *Cat. Lep. Ins. Brit. Mus.* i. p. 34. n. 161 (1852) (Honduras; Yucatan, acc. to Becker); id., *List Lep. Ins. Brit. Mus.* i. p. 46. n. 169 (1856) (Nicaragua; Honduras;—? Becker coll.); Ménétr., *Enum. Corp. Anim. Mus. Petrop., Léop.* i. p. 3. n. 50 (1857) (Nicaragua); Reak., *Proc. Ent. Soc. Philad.* ii. p. 135. n. 2 (1863) (Honduras; good description); Weidem., *ibid.* p. 147 (1863) (Mexico; Central America); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 302. n. 196 (1864) (Mexico; Honduras); Boisd., *Cons. Léop. Guatem.* p. 6. (1870) (Mexico; Honduras; Nicaragua;—"Colombia," error); Kirby, *Cat. Diurn. Lep.* p. 557. n. 262 (1871) (Amer. centr.); Butl. & Druce, *Proc. Zool. Soc. Lond.* p. 365. n. 376 (1874) ("Costa Rica," errore); Oberth., *Et. d'Ent.* iv. p. 65. n. 177 (1880) (Mexico); Eimer, *Arb. Verwandtsch. Schm.* p. 51. 111. t. 1. fig. 7 (1889) (Central Amer.); Godm. & Salv., *Biol. Centr. Amer., Rhop.* p. 221. n. 51. t. 68. fig. 5. genit. (1890) (Mexico; Vera Cruz, Yucatan; Brit. Honduras; Guatemala; Honduras; Nicaragua.—"Costa Rica" error loci; "San Blas" alia subsp.); Eimer, *Orthogen.* p. 47. 109. 311. 397 (1897).

♂ ♀. *Upperside*: second black band of forewing half the width or less of the interspace between it and third band; fifth band not joining the marginal band behind, stopping short at M^2 or at least not reaching this vein.—Median band of

hindwing vestigial beyond cell or very thin; red anal spots bordered with white in front; black distal band not broader between SC^2 and R^1 than the greenish white submarginal halfmoon.

In one of our females (Honduras) the fifth band of the forewing reaches well beyond SM^2 , nearly touching the marginal band.

Hab. Eastern Mexico: Vera Cruz, Yucatan; Guatemala; British Honduras; Honduras; "Nicaragua" (according to Ménétriés).

The black submarginal line of the forewing is often clearly marked down to M^2 , while in other specimens it is restricted to a costal spot.

In the Tring Museum 15 ♂♂, 4 ♀♀, from: Espinal, Vera Cruz, June 1896 (W. Schaus); Guatemala (Salvin); San Pedro Sula, Honduras.

b. P. epidaus tepicus subsp. nov.

Papilio epidaus Godman & Salv., *Biol. Centr. Amer., Rhop.* p. 221. n. 51 (1890) (*partim*; San Blas).

♂. Wings. *Upperside*.—Forewing: first and second black bands broader than in *ep. epidaus*, fifth band continued to hinder angle where it joins the marginal band.—Hindwing longer than in *ep. epidaus* and costally narrower, median band broad in front, more distinct beyond cell than in *ep. epidaus*; subbasal band thinner from cell backwards than in front; white border of red spot M^1 — M^2 thinner; black patch R^3 — M^1 larger, greenish white submarginal spots larger; tail more extended silvery white.

Underside: the same differences as above, but white border of red spot M^1 — M^2 of hindwing as large as in *ep. epidaus*.

Hab. West Mexico: Jalisco.

In the Tring Museum 1 ♂ from Jalisco; several specimens in coll. F. D. Godman from San Blas.

c. P. epidaus fenochionis Godm. & Salv. (1868).

Papilio fenochionis Godman & Salvin, *Ann. Mag. N. H.* (4). ii. p. 150 (1868) (Oaxaca); *id.*, *Biol. Centr. Amer., Rhop.* p. 222. n. 52. t. 68. fig. 13. 14. ♂ (1890) (Oaxaca).

♂♀. Fifth band of forewing extended to hinder angle. Subbasal and median bands of hindwing broad above and below, median band always reaching to the black distal area, which is much more extended than in the other two subspecies; red anal spots above without distinct white border, or the border very thin, the red spots being larger than in the other forms. Width of black bands of hindwing very variable; interspace between subbasal band and abdominal border often almost completely filled in with black-brown scaling.

Hab. South-Western Mexico: Oaxaca; Guerrero.

In the Tring Museum 64 ♂♂, 2 ♀♀, from: Guerrero (O. T. Baron); Salina Cruz, Tehuantepec, July 1904 (A. Hall); Oaxaca, July 1896 (W. Schaus).

147. *Papilio bellerophon* Dalm. (1823).

Papilio bellerophon Dalman, *Anal. Ent.* p. 37. n. 1 (1823); Boisdu, *Spec. Gén. Lép.* i. p. 264. n. 87. (1836) (Bahia; Pernambuco); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 15. n. 135 (1846); Doubl., *List Lep. Ins. Brit. Mus.* i. *Append.* p. 3 (1848) (Brazil); Gray, *Cat. Lep. Ins. i. Pap.* p. 33. n. 157 (1852) (Brazil); *id.*, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 45. n. 165 (1856) (Brazil). Ménétr., *Enum. Corp. Anim. Mus. Petrop., Lép.* i. p. 3. n. 48 (1857) (Brazil); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 301. n. 175 (1861) (Bras. anstr.); Kirby, *Cat. Diurn. Lep.* p. 555. n. 245 (1871) (Brazil); Oberth., *Et. d'Ent.* iv. p. 67. n. 184 (1880) (Brazil); Eimer, *Arth.*

Verwandsch. Schm. p. 53. 112. fig. N. t. i. fig. 12 (1889); Fickert, in Eimer, *l.c.* ii. p. 62. fig. E (1895) (neurulation).

Papilio coresilaus Godart, *Enc. Méth.* ix. *Suppl.* p. 810. n. 61-2 (1824).

Protesilaus swainsonius Swainson, *Zool. Illustr.* ii. t. 104 (1833).

♂ ♀. Antenna black, scaling of upperside black, usually fallen off. Black hairs of frons long. Tibiae and tarsi pale green, scales preserved in fresh specimens only; inner tibial spur longer than outer.

Wings yellowish white.—Forewing semitransparent; four black bands, one across cell, stopping short in front of M^2 , a second on cross-veins, joined at lower angle of cell to the third, which extends from costal margin to hinder angle or close to the angle, a fourth being marginal; scales of yellowish white areas very narrow, separate, sinuate, in posterior and basal areas alternately hair-shaped and triangular; on underside as above, but scales large and entire in posterior area of wing.—Hindwing much denser scaled than forewing, scales entire in costal area, abdominal and central areas from base to median band rather densely hairy; black median band thin, vestigial in front, slightly curved, touching apex of cell; the band complete on underside, centred with a more or less incomplete red line; scales of yellowish areas much narrower than on upperside, interspersed with fine hairs from base to median band.

The female larger than male; wings broader, distal margin of forewing more convex, red line of median band of hindwing vestigial on upperside; the median band more or less dilated in centre of wing on distal side, reminding one of *P. salvini*.

Neuration: SC^1 of forewing **absent**; C ending farther distad than in other species; PC of hindwing elbowed or nearly evenly curved; D^1 of hindwing about twice the length of D^2 , D^3 as long as or a little shorter than D^4 , angle of cell a little less than 90° .

Scent-organ: fold woolly, scales before and behind SM^2 entire, large, some scales of this kind also beneath the wool, which consists of thin long hairs, widest in middle, and of longer and thicker stiff hairs which end in an abrupt point.

Genitalia: ♂. Tenth tergite long, compressed, trilobate at apex; dorso-ventral ridge of harpe nearly continuous with dorsal edge of apical lobe, extending close to the rounded apex of this lobe, ventral margin of harpe dentate, the harpe produced proximally into a rounded lobe which reaches close to the ventral process, central process strongly compressed, abruptly pointed.—♀ not dissected.

Early stages not known.

Hab. Brazil.

In the Tring Museum 13 ♂♂, 1 ♀, from: Minas Geraes, February 1901 (A. Kennedy); Castro, Parana (E. D. Jones); Theresopolis, S. Catharina (J. Michaelis).

XV. Protesilaus Group.

The species of this group resemble one another so closely in pattern that many authors have treated them as mere individual varieties of one single species, with the exception of *P. agesilaus*, the distinctness of which the more recent authors at least have not doubted. We have studied this group carefully, the result being that we recognise no less than nine distinct species (as opposed to geographical and individual forms). These species are distinguished in the genitalia, in pattern and, at least partly, also in the scent-organ of the hindwing. Five of these species occur side by side over the greater part of tropical South America, while the others have

a more restricted range, Brazil being inhabited by no less than eight out of the nine species, of the ninth so far only a few Ecuadorian specimens being known. Two of these insects extend northwards to Mexico (*P. agesilaus* and *P. protesilaus*), a third species (*glaucolaus*) being found as far north as the isthmus of Panama.

The various species as they occur in the same district are in most cases easily distinguished from one another, but there is often hardly any difference in pattern between the individuals of one species from one district and the individuals of another species from another district, or two species are very different in one locality and almost identical in pattern in another. This renders it practically impossible to give a workable key to the species based on pattern only. Therefore we only group the species together according to pattern, and then give a key based on the genitalia of the males, the females being so rare in this group that for want of material we cannot take them into account in this key.

- a.* Inner edge of black postdiscal band of hindwing, upperside, quite straight down to M^1 , the partitions R^2-M^1 of this band not luniform
- A line of black spots in middle of upperside of hindwing Species No. 153.
 No black spots in middle of upperside of hindwing Species No. 152.
- b.* Inner edge of black postdiscal band of hindwing incised on veins R^2 , R^3 and M^1 , the partitions R^2-M^1 of the band being more or less luniform
- Ad- and submarginal interspaces of hindwing yellow Species Nos. 154 and 156.
 Ad- and submarginal interspaces of hindwing white or slightly buffish Species Nos. 149, 150, 151, 155.
- c.* Red line on underside of hindwing bordered with black on outside, not on innerside as it is in all the other species Species No. 148.

Key based on the ♂-genitalia and scent-organ; Species No. 148 not included, as it can easily be recognised by the pattern. See fig. 1, 2, and 3 on p. 708.

- a.* Dorso-apical ridge of harpe only slightly deflexed, being vertical on the plane of the clasper; the ridge continuous from dorsal edge of clasper to apex of harpe Species No. 149.
 Dorso-apical ridge of harpe strongly deflexed, lying almost flat on the main body of the harpe *b.*
- b.* This ridge dilated into a rounded lobe or a large tooth *c.*
 The ridge very narrow, hardly at all widened *d.*
- c.* The ridge rounded-dilated, not produced into a prominent tooth Species No. 150.*
 The ridge dilated into a large triangular tooth Species No. 151.
- d.* Hair-scales of scent-organ very thin *e.*
 Hair-scales of scent-organ shorter and broader than in *P. protesilaus* and the other species except *agesilaus* Species No. 156.
- e.* Ventral process of harpe reaching to ventral edge of clasper *f.*

* See also the subspecies *a*, *b*, and *c* of Species No. 151.

Ventral process of harpe not reaching to ventral edge of clasper	<i>g.</i>
<i>f.</i> Deflexed edge of dorso-apical ridge of harpe non-dentate	Species No. 154.
Deflexed edge of dorso-apical ridge of harpe serrate proximally	Species No. 152.
<i>g.</i> Central process of harpe short, broad, strongly dentate	Species No. 155.
Central process of harpe slender, its teeth vestigial	Species No. 153.

148. *Papilio agesilaus* Guér. (1835).

Papilio Equus Achivus protesilaus, Esper (*non* Linné, 1758, *err. det.*), *Aust. Schm.* p. 207. n. 95. t. 52. fig. 1 (1803?) (*partim*).

Papilio protesilaus, Godart, *Enc. Méth.* ix. p. 50. n. 73 (1819) (*partim*).

Papilio agesilaus Guérin & Percheron, *Gen. Ins. Lép.* t. 1. fig. 1 (1835) (R. Magdalena, Colombia); Boisd., *Spec. Gén.* i. p. 263. n. 86 (1836) (Mexico; Colombia); Doubl., Westw. & Hew., *Grn. Diurn. Lep.* i. p. 15. n. 136 (1846) (Mexico; Colombia); Eimer, *Artb. Verwandtsch. Schm.* p. 98 (1889); *id.*, *Orthogen.* pp. 44. 47. 111. 139. 217. 497 (1897).

♂ ♀. Antenna brownish black, scaled black on upperside in fresh specimens. Tibiae and tarsi pale green, scaled white, scales easily falling off, tips of tarsal segments ochraceous; mid- and hindtibiae spurs a little shorter than the tibiae is broad.

Wings greenish white; a few scales on disc of forewing, *upperside*, the scales from SC² of hindwing to costal margin and a large percentage of the scales between SC² and R³ of hindwing, entire: on *underside* the scales all denticulate, except between SM² of hindwing and abdominal margin; scales in apical area of forewing reduced, those of the transparent submarginal band very narrow, as are those in the costal area proximally of the black postdisical band. Forewing with seven black bands, subapical cell-band the most variable one, sometimes vestigial.—Hindwing, *below*, with black subbasal band which is almost parallel to abdominal margin, a black median band converging with the former, beginning at costal margin proximally of middle, meeting the subbasal band distally, or being abbreviated, bordered with red on **proximal** side; a red costal spot at distal side of subbasal band, another distally at proximal side of the band, besides the two red transverse spots situated near anal angle; these anal spots present also above, bordered with white in front, at least on the underside.—The female is like the male, but has rather larger pale submarginal spots on the hindwing.

Neuration: D² of hindwing shorter than D³ + D⁴, seldom as long as these cross-veins together.

Scent-organ: scent-scales forming a layer of black-brown wool; long hairs black-brown, thin, ending in a long fine point, not ending abruptly as in *P. telesilaus* or *P. marcellus*; no scales underneath the wool, except on SC³.

Genitalia: ♂. Tenth tergite trilobate; dorso-ventral ridge of harpe reaching ventral edge proximally of middle, the apical lobe of harpe being long, ventral process present.

Early stages not known.

Hab. From Goyaz, Brazil, and Bolivia to Panama, and again from Honduras to Mexico; not yet known from Costa Rica and Nicaragua.

Four very distinct geographical races.

There are some peculiarities in the variability of this species which are worth special notice. The subbasal band of the hindwing is present on the upperside

in the two Central American subspecies and in the South American subspecies, but is usually absent or only vestigial in the subspecies inhabiting Colombia, Panama, and North Venezuela. In this geographically intermediate subspecies the submedian band of the underside of the hindwing crosses the cell at or proximally of M^1 , while in the northern races and in the southern one this band is much more distal. On the other hand, the Central American and Colombian races differ from the southern subspecies in the scales of the black marginal and postdiscal bands of the forewing being broader and the bands therefore more deeply black, the postdiscal band being moreover not divided, and the black distal band of the hindwing, above, not bearing a distinct white spot R^2-R^3 proximally of the white submarginal spot which stands in front of the tail.

Another interesting feature of *agesilaus* are the opposite lines of development obtaining in the subbasal and submedian bands of the hindwing. The subbasal band, if not complete, is on the upperside usually more or less distinct from the cell backwards, the costal portion being missing. The submedian band of the upperside, if not altogether absent, is present only in the costal region, the posterior portion being missing.

a. P. agesilaus fortis subsp. nov.

Papilio neosilaus, Godm. & Salv. (*non* Hopffer, 1866, err. det.), *Biol. Centr. Amer., Rhop.* p. 219. n. 48 (1890) (Oaxaca; Atoyac).

♂. Black bands broad. Forewing: first and second black bands about two-thirds the width of the interspace between them, both extending to inner margin, or the second at least beyond SM^2 ; pale submarginal band not wider, or even narrower, than black postdiscal band; the latter not including a distinct pale line; the scales of this band and of the marginal one rather broad.—Hindwing: abdominal edge black from base to anal angle, black subbasal band complete; submedian band usually distinct from costal edge to cell, or at least vestigial; red anal spots separate from each other, each completely surrounded by black scaling, their white anterior borders vestigial or very narrow.

On *underside* the red submedian line of the hindwing extends to hinder edge of cell, its black border being heavy.

♀ not known.

Hab. Guerrero, South-west Mexico; Oaxaca; and Atoyac.

The Atoyac specimens (in coll. F. D. Godman) are a transition to the next form, the Oaxaca specimens also partly inclining towards the next.

In the Tring Museum 4 ♂♂ from Guerrero (O. T. Barou); name-type.

b. P. agesilaus neosilaus Hopff. (1866).

Papilio agesilaus, Boisduval, *Spec. Gén. Lep.* i. p. 263. n. 86 (1836) (*partim*; "Mexico"); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 146 (1863).

Papilio neosilaus Hopffer, *Stett. Ent. Zeit.* xxvii. p. 26. n. 6 (1866) ("Mexico," coll. Deppe); Kirby, *Cat. Diurn. Lep.* p. 556. n. 248a (1871) (Mexico); Godm. & Salv., *Biol. Centr. Amer., Rhop.* p. 219. n. 48. t. 8. 9. ♂ (1890) (Guatemala; Brit. Honduras; Honduras).

Papilio conon, Oberthür (*non* Hew., 1854, err. det.), *Et. d'Ent.* iv. p. 66. n. 179 (1880) (*partim*; Mexico).

Papilio agesilaus neosilaus, Eimer, *Arth. Verwandtsch. Schm.* p. 100. 101 (1889) (Honduras; Mexico).

♂. Black bands of wings narrower than in *P. a. fortis*; first and second bands of forewing about half the width (or less) of the interspace between them at M ; transparent submarginal band broader than the black band standing at its proximal

side.—Abdominal edge of hindwing partly white, submedian band absent from *upperside* or vestigial; red anal spots with broad white border in front, black sealing in front and behind the red spots much more restricted than in *fortis*, and black border to red submedian line of *underside* of hindwing narrower.

Subapical cell-band of forewing vestigial in one of our specimens from Espinal, Vera Cruz.

Hab. Vera Cruz, East Mexico; Guatemala; British Honduras; Honduras.

In the Tring Museum 10 ♂♂ from: Espinal, Vera Cruz, June 1896 (W. Schans); S. Pedro Sula, Honduras.

c. P. agesilaus eimeri subsp. nov.

Papilio agesilaus, Godman & Salv., *Biol. Centr. Amer., Rhop.* p. 219. n. 47 (1890) (Panama).

Papilio agesilaus agesilaus, Eimer, *Arth. Verwandtsch. Schm.* p. 99. t. 1. fig. 10 (1889) (S. Juan, West Colombia).

♂♀. Transparent submarginal band of forewing as narrow between SC⁴ and SC⁵ as the black band standing at its proximal side, or even narrower.

Hab. Rio Dagua, West Colombia; Upper Cauca valley.

In the Tring Museum 5 ♂♂ from: R. Dagua (W. F. H. Rosenberg); Popayan (Lehmann).

The Panama specimens stand intermediate between this form and ordinary Bogota specimens. Both sexes are from this locality in coll. F. D. Godman.

d. P. agesilaus agesilaus Guér. (1835).

Papilio Eques Achivus protesilaus, Esper (*non* Linné, 1758, err. det.), *l.c.*

Papilio agesilaus Guérin & Percheron, *Gen. Ins., Léop.* t. 1. fig. 1 (1835) (R. Magdalena, Colombia); Boisd., *Spec. Gén. Léop.* i. p. 263. n. 86 (1836) (*partim*; Colombia); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 301. n. 176 (1864) (N. Granada; Venezuela); Kirby, *Cat. Diurn. Lep.* p. 555. n. 247 (1871) (N. Granada; Venezuela); Oberth., *Et. d'Ent.* iv. p. 66. n. 178 (1880) (N. Granada; Venezuela); Staud., *Exot. Tagf.* i. p. 16 (1884); Hahnel, *Iris* iii. p. 149. 156 (1890) (San Estéban); *id.*, *l.c.* p. 203. 205 (1890) (Valéra).

Papilio conon Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 33. n. 159 (1852) (*nom. nud.*; Bogota); Hew., *Trans. Ent. Soc. Lond.* (2). ii. p. 246. t. 22. fig. 3 (1854) (N. Granada); Gray, *List Lep. Ins. Brit. Mus. i. Pap.* p. 45. n. 167 (1856) (Bogota).

Papilio agesilaus agesilaus, Eimer, *Arth. Verwandtsch. Schm.* p. 99. t. 1. fig. 11 (1889) (Colombia; Venezuela).

Papilio agesilaus agesilaus septemlineatus *id.*, *l.c.* p. 100 (1889) (N. Granada).

Papilio agesilaus Boisd. *ab. septemlineatus* *id.*, *l.c.* t. 1. fig. 11 (1889).

Papilio agesilaus var. *conon*, Maassen & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 24. n. 109 (1890) (west side of Cordillera of Bogota).

Papilio agesilaus septemlineatus Eimer, *Orthogen.* p. 47 (1897).

♂. Black postdiscal band of forewing, above, not centred by a pale line, the scales of this and the marginal band rather broad; anterior half of transparent submarginal band broader than black postdiscal band.—Subbasal black band of hindwing absent from *upperside*, except a thin line on M²; submedian band absent, merely showing through; no white spot R²—R³ in black postdiscal band.

Underside.—Submedian band of hindwing crossing cell proximally of or at M¹, the band complete as a rule, joining the subbasal band at an acute angle.

Genitalia: Distal lobe of harpe broad, ventral edge ending proximally in a rather heavy tooth.

This subspecies varies a great deal in size, some specimens being almost twice as large as others. We do not know if the variation is seasonal. Dr. Bürger

obtained only large specimens during the dry season and at the beginning of the wet season on the eastern side of the Andes of Bogota. We have also a large specimen from Muzo, besides some small ones. The submedian band of the *underside* of the hindwing is occasionally vestigial beyond cell. In a specimen from the Felder collection, bearing no locality label, but coming probably from Bogota, there are two whitish halfmoons R^2-M^1 within the black distal band, the black scaling situated proximally of these halfmoons being ill-defined.

Hab. Magdalena valley, Colombia, eastwards to North Venezuela.

In the Tring Museum 94 ♂♂ from: "Bogota": Valdivia, Colombia, July 1897 (Pratt); Muzo, December 1896; Villavicencio to R. Ocoor, January 1897, 350—400 m., dry season (Dr. Bürger); Villavicencio to Monte Redondo, end of March—early April 1897, 400—1300 m., beginning of rainy season (Dr. Bürger); Peperital, Buenavista, January 1897 (Dr. Bürger); Mocotoné, Venezuela (Briceño).

e. P. aegisilus autosilvus Bates (1861).

- Papilio aegisilus*, Doubleday, *List Lep. Ins. Brit. Mus.* i. p. 9 (1845) (S. Amer.); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 45. n. 166 (1856) (S. Amer.; Brazil); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 254 (1854) (Amazons); Sharpe, *Proc. Zool. Soc. Lond.* p. 555. n. 6 (1890) (R. Araguaya).
Papilio autosilvus Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 348 (1861) (Ega); id., *Journ. Ent.* i. p. 229. n. 34 (1862) (Upper Amazons); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 301. n. 177 (1864) (Ega; "Mexico," error); Kirby, *Cat. Diurn. Lep.* p. 555. n. 246 (1871) (Ega); Druce, *Proc. Zool. Soc. Lond.* p. 245. n. 12 (1876) (Ucayali); Oberth., *Et. d'Ent.* iv. p. 66. & 115. n. 180 (1880) (French Guiana; Tefé; "Colombia," errore); Möchl., *Verh. Zool. Bot. Ges. Wien* xxxii. p. 304 (1883) (Surinam); Staud., *Exot. Tagf.* i. p. 16. t. 11 (1884) (Amazons); Hahnel, *Iris* iii. p. 250 (1890) (Maucés); id., *l.c.* p. 283 (1890) (Pebas); Michael, *ibid.* v. p. 214 (1894) (Sao Paulo de Olivença, only during the dry months); Hlausch, *Berl. Ent. Zeitschr.* xlvii. p. 154 (1903) (Archidona, 640 m.).
Papilio conon, Oberthür, *Et. d'Ent.* iv. p. 66. n. 179 (1880) (*partim*; Peru).
Papilio aegisilus autosilvus, Eimer, *Arth. Verwandtsch. Schm.* p. 100. 101. t. 1. fig. 9 (1889) (Amazons).

♂. Scales of black marginal border and postdiscal band of forewing narrower than in the other forms, these bands therefore less deep black; postdiscal band divided longitudinally by a usually distinct pale line; transparent submarginal band of forewing narrower than in the other subspecies, always narrower between SC^4 and SC^5 than the black postdiscal band.—Subbasal band of hindwing present on *upperside*, submedian band of *underside* of hindwing crossing cell at M^1 , curved behind, often feebly developed in and beyond cell, sometimes vestigial beyond cell; red subanal spot M^1-M^2 vestigial or absent, apparently never so well developed as it is in most specimens of the preceding races; a more or less distinct white spot within black band proximally of white spot R^2-R^3 of hindwing above, seldom vestigial only, often a second spot between R^3 and M^1 , and the vestige of a third between R^1 and R^2 , rarely also a trace of the spot SC^2-R^1 .

The black subapical cell-band of the forewing varies very much; it is vestigial in a Felder specimen (without locality).

Genitalia: Apical lobe of harpe narrower than in the other races, the dentate ventral edge proximally not produced into a prominent tooth.

The specimens from British Guiana have rather heavier black bands: the second band of the forewing is nearly as broad in the cell as the interspace between the first and second bands; the marginal and postdiscal bands are deeper black than in *autosilvus* from the Amazons and Andes, the pale line within the postdiscal band being practically absent from the upperside. The interspace between the post-

discal band and the discocellular band is narrower than the postdiscal band, while in nearly every specimen from other districts this interspace is wider at and before lower angle of cell than the black postdiscal band. On the hindwing, the black submedian line of the *underside* is rather heavy beyond cell, ending in a black spot M^1-M^2 which is larger than in ordinary *autosilvus*.

The black bands are on the whole rather narrower in the specimens from Bolivia, South-Eastern Peru and Goyaz (Brazil) than in the individuals from the more northern localities (Peru, Ecuador, Amazonas).

Eimer's fig. 9, *i.e.*, said to be taken from an Amazonian specimen, has a very short hindwing, the anal area being far less prolonged than is the case in all our specimens. The individual which served as model may have been an imperfectly developed specimen.

Hab. Bolivia to Eastern Ecuador; Amazonas; Goyaz; Guiana; Orinoco.

In the Tring Museum 140 ♂♂ from: Suapure, Caure R., Orinoco, February and June 1899 (S. M. Klages); Essequibo R., Brit. Guiana; British Guiana; Manicoré; Iquitos; R. Cachyaco, affl. of R. Huallaga (Stuart); Zamora, Ecuador (O. T. Baron); Loja; Archidona (W. Goodfellow); R. Chuchurus, affl. of R. Palcazu, 320 m. (W. Hoffmanns); Palcazu (Sedlmayr); Chauchamayo (Schunke); Peréné R., 3000 ft., October—November 1902 (Watkins & Tomlinson); Peréné R., March 1900 (Simous); Caradoc, Marcapata, February 1901, 4000 ft. (Oekenden); Montanas, R. Madre de Dios, September 1901 (Oekenden); R. Slucuri, Carabaya, June 1901, 2500 ft., dry season (Oekenden); Chirimayo, Carabaya, 1000 ft., July 1901 (Oekenden); Callanga, Cuzco, 1500 m. (Garlepp); Cajon, Cuzco, September 1900 (Garlepp); Mapiri; Reyes, R. Beni, August 1895 (Stuart); R. Tanampaya (Garlepp); Yungas de La Paz, December 1899 (Garlepp); Province Sara, S. Cruz de la Sierra, February—April 1904 (J. Steinbach); Sajuncay, Paraguay, July 1902 (W. Foster); Jataly, Goyaz.

149. *Papilio glaucolaus* Bates (1864) (Pl. IX. fig. 63. 64. 65).

Papilio glaucolaus Bates, *Ent. Mo. Mag.* i. p. 4. n. 7 (1864) (Panama).

The species has not been recognised by any of the authors who have dealt with this group of *Papilios*. Staudinger, in *Exot. Tugf.* i. p. 18 (1884), speaks of *glaucolaus* from Panama as being larger than *macrosilvus* from Honduras; his *glaucolaus* was doubtless *protesilvus*, since the true *glaucolaus* from Panama is smaller than the average specimens of *macrosilvus*. In Eimer, *Arb. Verwandtsch. Schm.* p. 102 f^r (1889), the various species and subspecies are all muddled up. In this work *glaucolaus* is called the largest *protesilvus*, while in fact *P. glaucolaus* from Panama and Colombia is decidedly smaller than the forms of *P. protesilvus* with which it occurs together.

We recognise three geographical forms of *glaucolaus*. While the two northern forms (Panama and Colombia) are easily recognised by the distinctions in pattern, the third subspecies almost exactly resembles *P. protesilvus protesilvus*, being distinguishable with certainty only by comparison of the genitalia.

♂. Postdiscal band of forewing more widely separate from lower angle of cell than in *P. p. protesilvus*, or the hindwing more obtusely dentate at R^1 and R^3 and the posterior submarginal spots slightly buffish, the wings not being so pure white as in *P. p. protesilvus*.

Scent-organ as in *P. protesilvus*.

Genitalia: Harpe shorter than in *P. protesilaus*: deflexed dorso-apical ridge (*dr*) subvertical on the harpe, continued to apex, enlarged into a prominent dentate tooth (*t*); ventral process (*vp*) short, reaching halfway (or less) to ventral edge of clasper; central process (*cp*) also short (Fig. 1).

♀ not known.

Hab. Panama to Matto Grosso, not known to us from the Brazilian subregion.



Fig. 1.

Fig. 2.

Fig. 3.

a. *P. glaucolaus glaucolaus* Bates (1864) (Pl. IX. fig. 64).

Papilio glaucolaus Bates l.c. (Panama).

Papilio protesilaus var. e. *P. glaucolaus*, Kirby, *Cat. Diurn. Lep.* p. 556. sub. n. 248 (1871) (Panama).

Papilio protesilaus, Oberthür, *Et. d'Ent.* iv. p. 66. sub n. 181 (1880) (Carare, greenish, this insect teste Jordan).

Papilio protesilaus, Godman & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 213. n. 39 (1890) (*partim*).

♂. Both wings pervaded with a greenish tint, which becomes very distinct if a series of *P. gl. glaucolaus* are put side by side with *P. protesilaus*. Forewing similar in appearance to that of *P. ag. agesilaus*; bands 1 and 2 stopping at SM^2 , 2 often not reaching this vein; fifth band narrowed to a point, mostly not quite reaching lower angle of cell; sixth band more distal in position than in *P. protesilaus*, being $1\frac{3}{4}$ to 3 mm. distant from lower angle of cell, gradually widening costad, not narrowed before R^2 ; transparent submarginal interspace at SC^6 at least twice the width of the black marginal band.—Hindwing: red anal spot often much reduced, being overpowdered with black scales at the abdominal side; black spot situated in front of red one usually oblong, often continued abdominad beyond M^2 .

Underside: fifth band of forewing mostly reaching across cell, extended at least to third cell-fold in our series.—Subbasal band of hindwing touching apex of basal cellule; median band a little distal of base of M^1 , the band usually not touching the point of origin of this vein; cross-veins partly bordered with red, sometimes the red scaling forming a complete ring in apex of cell.

Genitalia: Harpe tapering; tooth of dorso-apical ridge broad; central process slightly spatulate.

Length of forewing: 40 to 47 mm.

Hab. Panama; Colombia, except S.W. coast; probably also Northern Venezuela.

In the Tring Museum 20 ♂♂ from: Panama: Muzo, December 1896; "Bogota;" La Vega de San Juan.

b. P. glaucolaus melacnus subsp. nov. (Pl. IX. fig. 63).

Papilio spec. ? , Staudinger, *Exot. Tagf.* i. p. 18 (1884) (R. San Juan).

♂. Black bands of the forewing on the whole broader than in the preceding ; the submarginal transparent interspace narrower, being usually only a little broader at SC⁵ than the black marginal band, or as broad as this band, specimens in which the submarginal interspace is unusually wide being recognizable as belonging to *P. glaucolaus melacnus* by a corresponding reduction of the interspace between bands 5 and 6.

In this as well as the preceding form the black postdiscal band of the forewing stands often distally of the point of bifurcation of the subcostals SC⁴ and SC⁵, which is rarely the case in the following form.

Length of forewing : 40 to 50 mm.

Hab. Rio Dagua, West Colombia ; Upper Cauca valley.

In the Tring Museum 22 ♀ ♀ from : R. Dagua (W. F. H. Rosenberg), type ; Popayan (Lehmann).

c. P. glaucolaus leucas subsp. nov. (Pl. IX. fig. 65).

♂. Wings not pervaded with green, except base, which is distinctly green up to second band on forewing ; postdiscal band of forewing in the same position as in *P. p. protesilaus*, being much nearer the lower angle of cell than in the preceding forms of *P. glaucolaus*, and being, moreover, narrowed before R² in most specimens ; transparent submarginal interspace wider than in *P. gl. glaucolaus* ; white interspaces of cell covered with narrower scales, therefore appearing less densely scaled than in the preceding forms. Subbasal band of *underside* of hindwing entering basal cellule.

Genitalia : Harpe shorter and more obtuse at apex than in *P. gl. glaucolaus* and *melacnus*, the tooth of the dorso-apical ridge narrower, and the central process longer, pointed (Fig. 1, p. 708).

Resembling in pattern more closely *P. p. protesilaus* than the Colombian forms of *P. glaucolaus* ; differs from *P. p. protesilaus* in the hindwing being more obtusely dentate, in the ad- and submarginal spots being pervaded with buff, which colour becomes rather distinct in specimens of *P. p. protesilaus* and *P. gl. leucas* are compared side by side ; the second band of the forewing is on the upperside usually much narrower from the cell backwards than on the underside, this portion of the band appearing on the upperside much blurred in consequence of the band of the underside shining through, and being in some individuals very thin or even absent ; the fourth cell-band is shorter on the whole than in Guiana specimens of *P. protesilaus*. The frons has always clearly defined white lateral bands, never being all fuscous as it is in many specimens of *P. p. protesilaus*. The scales of the pale blue admarginal spots of the hindwing are dentate, while in *P. p. protesilaus* they are mostly entire.

Length of forewing : 41 to 48 mm.

Hab. Orinoco, Caura R. ; British Guiana ; Amazons ; Eastern Ecuador ; Peru ; Matto Grosso.—Name-type from Rio Chuchuras.

In the Tring Museum 60 ♂♂ from : Snapure, Caura R., Orinoco, apparently all the year (S. M. Klages) ; La Vuelta, Caura R., May 1903 (S. M. Klages) ; R. Demerara, August 1897 ; Upper Real Berbice R. ; R. Negro ; R. Uaupes, R. Negro ; Coca and Archidona (W. Goodfellow) ; Upper Amazons ; R. Chuchuras,

affl. of R. Palcazu, 320 m. (W. Hoffmanns); Rio Cachaeco, affl. of R. Huallaga (Stuart); R. Ucayali (Stuart); Iquitos (Stuart); Chanchamayo (Schunke); Perené R., 4000 ft., August—September 1902 (Watkins & Tomlinson); Villa Maria to Diamantino, Matto Grosso, January 1897 (Audeer).

150. *Papilio molops* spec. nov. (Pl. IX. fig. 60, 61, 62).

As in *P. glaucolaus* there are also in the present species no striking characters in the pattern by which one could recognise *P. molops* with absolute certainty, except the *molops* form from the coast of Ecuador and Colombia and the form from Brasilia, which differ very conspicuously from the forms of *P. protesilaus* occurring in the same districts. However, as the genitalia of *molops* (of the male, the female being unknown) are constantly different from those of the various South American subspecies of *protesilaus*, it is not very difficult to distinguish also the *molops* specimens from Surinam, the Amazons and the Andes from *protesilaus* as well as from *glaucolaus*.

♂. Frons always greyish white at the sides, inclusive of the Brazilian form with black antenna. Both the first and second black bands of the forewing extending to hinder margin, or the second slightly abbreviated, or the first abbreviated; in the last case the postdiscal band very broad, being at lower angle of cell as broad as the transparent submarginal band; fourth band reaching nearly across cell, seldom stopping at third cell-fold.—Hindwing less strongly dentate than in *P. protesilaus archesilaus*, but more strongly than in *P. glaucolaus*; black admarginal bar R^2-R^3 as slender as in *P. protesilaus*, while the admarginal bars R^3-M^2 are usually broader than in that species.

On the *underside*, the subbasal and median bands of the hindwing on the whole closer together than in *P. protesilaus*, the interspace less widening costad and that portion which lies behind the cell longer, the black patch M^1-M^2 which connects posteriorly the subbasal and median bands being smaller; red anal bar usually quite close to the black anal marginal spot, the white spot separating them from one another being reduced to a small dot in nearly every specimen.

Scent-organ as in *P. protesilaus*.

Genitalia: Dorso-apical deflexed ridge of harpe rounded-dilated, denticulate, but not produced into a prominent triangular tooth (Fig. 2, p. 708).

Early stages not known.

Hab. South America.

Three subspecies.

a. P. molops molops subsp. nov. (Pl. IX. fig. 62).

♂. Antenna tawny, club black, at least on upperside; black lateral streak of abdomen as broad as the buffish white streak situated above it.

Wings.—*Upperside*: first band of forewing stopping at SM^2 , second band strongly tapering, reaching hinder margin, broad in cell, third and fifth bands also broad, interspace between fifth and sixth bands not wider than the sixth band, which is broader than in all the other forms of the species allied to *P. protesilaus*, the white costal dot of this interspace minute, the sixth band very close to lower angle of cell, therefore differing considerably in position from

the band of *P. glaucolaus*; marginal band also broad, the submarginal interspace therefore narrower than in the other *molops* forms, being at R^2 about as wide as the marginal bands.—Hindwing: red anal spot large, stopping halfway between M^1 and M^2 , obliquely truncate, the black spot M^1-M^2 in front of it large, trapeziform, somewhat produced basad at M^1 , no black bar M^2-SM^2 proximally of red spot; postdisco-marginal band broad, partition R^2-R^3 wider in middle than the white admarginal lunule R^2-R^3 ; partition R^3-M^1 also broad, its edges not sharply defined, the white (slightly buffish) submarginal lunule which stands at its distal side reduced, somewhat powdered with black, as is the white submarginal spot M^1-M^2 ; the postdiscal black bar bordering this latter spot proximally joining the black anal spot; white marginal spot before R^2 small, the one before tail less extending distad than in the next form; first admarginal lunule vestigial, submarginal lunule R^1-R^2 also densely shaded with black.

Underside:—fourth band of forewing extending across cell or very nearly.—Subbasal band of hindwing distally of basal cell, not entering it; red sealing of median band extending along cross-veins, forming a more or less complete ring in apex of cell; red transverse bar M^2-SM^2 heavy; red bar M^1-M^2 \square -shaped; black arrowhead-shaped patch on abdominal fold large, white lunules R^3-M^2 small.

Genitalia: Deflexed dorso-apical ridge of harpe more or less abruptly dilated, the lobe sinuate in one of our two Ecuadorian specimens, no teeth beyond the lobe; teeth on ventral edge of harpe irregularly placed and of different sizes; central process rather broadly spatulate, denticulate on dorsal side, the teeth somewhat curved in the direction of the base of the process; ventral process acute, non-dentate, not quite reaching the ventral edge of the clasper, its apex somewhat curving distad and away from the clasper.

Hab. N.W. Ecuador: R. Cayapas (Flemming and Miketta), *type*; Caehabi; low country, January 1897 (W. F. H. Rosenberg).

2 ♂♂ in Mus. Tring. In coll. Charles Oberthür, from Juntas, R. Dagua, West Colombia (M. de Mathan).

b. P. molops hetuerius subsp. nov. (Pl. IX. fig. 61).

♂. Very closely agreeing in pattern with *P. protesilaus protesilaus*; the Colombian specimens smaller than the Colombian *P. p. archesilaus*, the hindwing less strongly dentate. Frons never entirely brown-black, as is so often the case in Andesian specimens of *P. p. protesilaus*. First band of forewing always extending to hinder margin, second band very broad in cell, reaching to hinder margin in most specimens, or at least close to it.—Hindwing with a white submarginal lunule R^1-R^2 , which is thinner than the admarginal one, being occasionally vestigial; black admarginal spots R^3-M^2 rather larger than in *P. p. protesilaus*, especially M^1-M^2 .

Underside: interspace between subbasal and median bands of hindwing longer than in *protesilaus*.

Genitalia: Deflexed dorso-apical ridge of harpe (Fig. 2, p. 708) usually dentate beyond the proximal dentate lobe; ventral edge of harpe more densely dentate than in *P. m. molops*, central process more slender and its teeth shorter, ventral process longer, reaching edge of clasper, curved towards this edge, not away from it, usually with some teeth on the distal side or at the apex.

Hab. Guiana; Amazons; Colombia and Ecuador (Pacific side excepted); Peru; Bolivia; *type* from Saramacca R., Surinam.

In the Tring Museum 17 ♂♂ from: "Bogota"; Villavicencio to Rio Ocoor, East Colombia, January 1897 (Dr. Bürger); R. Demerara; Saramacca R., Surinam, May 1893; Iqnitos; "Amazons"; Archidona, N.E. Ecuador, April 1899 (W. Goodfellow); Coca, R. Napo (W. Goodfellow); R. Chuchuras, affl. of R. Palcazu, 320 m. (W. Hoffmanns); Mapiri, Bolivia.

c. P. molops megalurus subsp. nov. (Pl. IX. fig. 60).

♂. Antenna black, as in *P. protesilaus nigricornis*, but sides of frons white; white dorso-lateral stripe of abdomen narrow. First and second band of forewing, *upper side*, reaching hinder margin, but second strongly tapering, interspace a little wider than in the preceding form; sixth band separate from lower angle of cell; transparent submarginal interspace narrower than in *P. m. heterius*, not being wider within subcostal fork than the interspace between fourth and fifth bands measured at third cell-fold.—Black markings a little more extended than in *heterius*, first white admarginal lunule hardly traceable, second very thin, or also vestigial, no white submarginal lunule R^1-R^2 , the admarginal one being alone present, the other white ad- and submarginal spots also smaller than in *heterius*; red anal spot longer, the white spot M^1-M^2 standing at its discal side correspondingly smaller, the black spot M^1-M^2 in front of the red spot larger, continued abrad and produced basad in the abdominal fold, the spot somewhat widened also discally at M^1 , there being some black scales between the spot and the cell corresponding to the outer edge of the median band of the underside; tail longer and broader than in the other two forms.

Interspace between subbasal and median bands of *underside* of hindwing rather wider than in the two preceding forms, the median band being distinctly more distal, crossing cell at base of M^1 ; white lunule $C-SC^2$ hardly vestigial, only one white lunule R^1-R^2 , the other white lunules also reduced.

Genitalia: Distal lobe of harpe narrow, teeth small; deflexed dorso-apical ridge less dilated than in the other forms of *molops*; central process curved proximad at tip, teeth vestigial; ventral process not quite reaching edge of clasper, curved towards this edge, non-dentate.

Hab. Brazil: Leopoldina.

In the Tring Museum 2 ♂♂.

151. *Papilio protesilaus* L. (1758) (Pl. IX. fig. 66. 67).

Merian, *Ins. Surinam* t. 43 (1705); Gronov., *Zoophyl.* ii. p. 188. n. 726 (1764); Seba, *Thesaur.* iv. p. 44. t. 36. fig. 11. 12 (1764); Anbent., *Planch. Enum.* t. 44. fig. 1. 2 (1765).
Papilio Eques Achivus protesilaus Linné, *Syst. Nat.* ed. x. p. 463. n. 29 (1758) (*partim*); Clerck, *Leon. Ins.* ii. t. 27. fig. 2 (1764) (fig. sat mala); Linné, *Mus. Lud. Ubr.* p. 209. n. 28 (1764) (*partim*); id., *Syst. Nat.* ed. xii. p. 752. n. 39 (1767) (*partim*); Fabr., *Syst. Ent.* p. 450. n. 36 (1775) (*partim*); Sulzer, *Gesch. Ins.* i. p. 143; ii. t. 11. fig. 5 (1776) (synon. *partim*); Goeze, *Ent. Beytr.* iii. 1. p. 64. n. 39 (1779) (cit. "Pet. Mus." excl.); Cram., *Pap. Erot.* iii. p. 16. t. 202. fig. A. B (1779) ("North & South America"); Fabr., *Spec. Ins.* ii. p. 14. n. 56 (1781) (*partim*); id., *Mant. Ins.* ii. p. 7. n. 62 (1787) (*partim*); Jabl. & Herbst, *Naturs. Schm.* iii. p. 147. n. 97 (1788) (*partim*); Sulzer, ed. Roem., *Gesch. Ins.* p. 17. t. 14. fig. 5 (1789) ("Am. sept." errore); Gmelin, *Syst. Nat.* i. 5. p. 2243. n. 39 (1790) (*partim*); Fabr., *Ent. Syst.* iii. 1. p. 23. n. 69 (1793) (*partim*); Turton, *Syst. of Nat.* iii. 2. p. 16 (1806) (*partim*).

- Papilio Eques protesilaus*, Lange, in Linné, *Syst. Nat.* p. 463. n. 29 (1760) (*partim*).
Papilio (Achirus) protesilaus, Müller, *Naturs.* v. 1. p. 577. n. 39 (1774) ("N. Am." error).
Papilio Eques Achirus protesilaus (?), Menschen, in Gronov., *Zoophyl.*, *Index* (1781).
Papilio protesilaus Godart, *Enc. Méth.* ix. p. 50. n. 73 (1819) (*partim*); Lucas, *Lép. Ecot.* p. 41 (1835) (*partim*); Brazil; *see fig.*); Boisl., *Spec. Gén. Léop.* i. p. 262. n. 85 (1836) (French Guiana; Brazil); Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vii. p. 46 (1838) (*partim*); Duncan, in Jard., *Nat. Libr.* xxxvi. p. 104. t. 4. fig. 2 (1843) (*partim*); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 9 (1845) (Brazil; Brit. Guiana); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 15. n. 137 (1846) (*syn. partim*; Honduras; Guiana; Brazil); Erichs., in Schomb., *F. F. Brit. Guiana* p. 593 (1848); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 33. n. 160 (1852) (*partim*); Burm., *Abh. Naturf. Ges. Halle* p. 63 (1854) (Meriau's plate 43); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 45. n. 168 (1856) (Brazil; R. Demerara); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 348 (1861) (*partim*); id., *Journ. Ent.* i. p. 229. n. 33 (1862) (*partim*); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 148 (1863) (*partim*); Bates, *Proc. Zool. Soc. Lond.* p. 241. n. 2 (1863); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 301. n. 178 (1864); Kirby, *Cat. Diurn. Lep.* p. 555. n. 248 (1871) (*partim*); id., *l.c.* p. 811. n. 248 (1877); Burm., *Descr. Rép. Argent. v. Lep., Atlas* p. 3. n. 1 (1879) (mixture of many species); Hopff., *Stett. Ent. Zeit.* xl. p. 52. n. 18 (1879) (Surinam, Brazil, Peru); Anriv., *K. Sv. Vet. Akad. Handl.* xix. 5. p. 29. n. 28 (1882) (recensio critica; cit. "Herbst t. 43" et "Lucas t. 21" exceptae); Eimer, *Arb. Verwandsch. Schm.* p. 50. 103. 108. t. 1. fig. 5. 6 (1889) (*partim*); Haase, *Untersuch. Mimicry* i. p. 82 (1893); Eimer, *Orthogen.* p. 33. 44. 47. 48. 217. 397 (1897) (*partim*).
Protesilaus leilus Swainson, *Zool. Illustr.* ii. t. 93 (1832) (nom. nov. loco "protesilai").
Cosmodesmus protesilaus, Kirby, in Allen, *Nat. Libr., Lep.* i. p. 273 (1896).
Iphiclideles protesilaus, id., *l.c.* t. 68. fig. 2 (1896).

Under the name of *protesilaus* Linné described a mixture of several banded species of Papilionids and Nymphalids. As the wings are said in his diagnosis to be white, we restrict the name to a black-banded white *Papilio*, as has been done by every author since Linné's time. However, which of the various species of the present group the white *Papilio* of Linné was, nobody can possibly tell with certainty from the description given by Linné and the figures quoted by him. In Clerck's figure the hindwing is obviously too obtusely dentate. There is a specimen (without abdomen) in the collection of the Linnean Society of London which agrees fairly well with Clerck's figure.* Aucton's figure, which is very good for that time, represents doubtless the most common one of the different white species, to which insect we apply the name *protesilaus*. As Linné's Neotropical Lepidoptera were practically all from Surinam, we treat also in this case the Surinam form as nomenclatorially typical.

♂♀. Submarginal interspaces of hindwing white, rarely slightly washed with yellow; dentition of hindwing stronger than in *P. glaucolans*. The first and second band of the forewing on the whole shorter and narrower than in *P. molops*. Frons often all black or slightly whitish at sides.

Scent-organ: wool long and dense, consisting of long and thin hairs which are widest in centre, being much thinner than in *P. telesilaus*.

Genitalia different in the various subspecies; dorso-apical ridge of harpe slightly or strongly dilated, always strongly dentate, in the South American forms widened to a large triangular tooth (Fig. 3; p. 708); the ridge strongly deflexed, lying almost flat upon the main body of the harpe.

Early stages not known. The larva figured by Meriau, *l.c.*, is not that of this species, but of a *Heliconius*. It is much to be desired that the early stages of this and the allied species be carefully observed.

Hab. Mexico to Paraguay and Rio Grande do Sul.

* See p. 413.

a. P. protesilaus penthesilaus Feld. (1865).

Papilio penthesilaus Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 301. n. 181 (1864) (Mexico; *nom. nud.*); id., *Reise Novara, Lep.* p. 52. n. 40. t. 11. fig. C (1865); Staud., *Exot. Taf.* i. p. 18 (1884) (Mexico); Godm. & Salv., *Biol. Centr. Amer., Rhop.* p. 214. n. 40 (1890) (Mexico; Atoyac, Oaxaca, Yucatan).

Papilio protesilaus var. *c. P. penthesilaus*, Kirby, *Cat. Diurn. Lep.* p. 556. sub n. 248 (1871) (Mexico).

Papilio archesilaus var. *penthesilaus*, Oberthür, *Et. d'Ent.* iv. p. 67. n. 182 (1880) (Mexico).

♂. A large form. Dorsal stripe of abdomen very narrow. First band of forewing stopping at SM^2 , second band reaching a little beyond SM^2 , strongly tapering behind, fourth band short, triangular, rarely reaching to second cell-fold, sixth band separate from lower angle of cell, slightly narrower from R^2 to SC^3 than behind R^2 , posteriorly almost separated from the marginal band in most specimens, there being a semitransparent space behind M^2 between the two bands; submarginal transparent interspace bearing very narrow scales which are widest at their apex, the apical sinns being more or less distinct, these scales easily falling off.—Red anal spot of hindwing large; black postdiscal lunules R^2-M^1 more or less separate from each other; black admarginal lunules reduced; edge of wing white, except the very tips of veins C, SC^2 , R^1 and M^2 ; dentition very prominent, especially at R^2 .

Underside: second band of forewing broader than above between M and SM^2 . Subbasal band of hindwing about half the width of the median band; red scaling of the latter more or less extended along cross-veins, often forming a ring in apex of cell; red bar R^2-M^1 not much continued along M¹.

♀ not known.

Genitalia: ♂. Apical lobe of harpe acuminate, the apical and ventral margins dentate, dorso-apical deflexed ridge rounded, widened distally of the central process, serrate; central process long, slender, slightly spatulate, somewhat denticulate at the apex; ventral process reaching a little beyond the edge of the valve, non-denticulate, pointed, applied to the valve, somewhat S-shaped, its curvature corresponding to that of the inner surface of the valve.

Early stages not known.

Hab. Mexico: Vera Cruz, Yucatan, Atoyac, Oaxaca.

Felder's specimens were from Oaxaca. The individuals from East and South Mexico are not always different from the next form.

In the Tring Museum, 4♂♂ from: Oaxaca (ex coll. Felder); Motzorongo; Orizaba.

b. P. protesilaus macrosilaus Gray (1852).

Papilio protesilaus var. *b. P. macrosilaus* Gray, *Cat. Lep. Ins. Brit. Mus.* i. p. 34. sub n. 160 (1852) (Honduras); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 46. sub n. 168 (1856) (Honduras).

Papilio protesilaus, Weidemeyer, *Proc. Ent. Soc. Philad.* ii. p. 148 (1863) (*partim*); Boisd., *Cons. Lép. Guatem.* p. 6 (1870) (*partim*; Guatemala); Butl. & Druce, *Proc. Zool. Soc. Lond.* p. 365. n. 375 (1874) (Costa Rica); Godm. & Salv., *Biol. Centr. Amer., Rhop.* p. 214. n. 40. t. 68. fig. 7. genit. (1890) (*partim*; Guatemala: Vera Paz, Cabilguitz, Polochic valley, Cahabon; Brit. Honduras: Corosal, R. Sarstoon; Honduras; Nicaragua: Chontales).

Papilio protesilaus var. ? *a. macrosilaus*, Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 301. sub n. 178 (1864) (Honduras).

Papilio protesilaus var. *a. P. macrosilaus*, Kirby, *Cat. Diurn. Lep.* p. 556. sub n. 248 (1871) (Honduras).

Papilio macrosilaus, Staudinger, *Exot. Taf.* i. p. 18 (1884) (Honduras).

Papilio protesilaus rubrocinctus macrosilaus, Eimer, *Artb. Verewndtsch. Schm.* p. 107 (1889) (Honduras).

♂ ♀. Similar to *penthésilais*, paler in appearance. Subbasal band of forewing thinner, second band also narrower, stopping short at SM², crossing M one mm. proximally of M², the interspace between bands 1 and 2 being rather narrower at M than that between bands 2 and 3; band 4 absent, or vestigial at costal margin, or represented by a distinct costal spot; band 5 subangulate at R², narrow from R² costad, merged together with the marginal band at M² or close behind it, the pale interstitial spot behind M², if at all present, being smaller than in *penthésilais*; marginal band less sharply defined and a little paler than in *penthésilais*, the scales composing it being narrower; submarginal transparent interspace bearing very narrow hairlike scales which do not fall off easily, being present even in worn specimens, while the respective scales of *penthésilais*, which are much broader, are usually lost even in comparatively fresh specimens.—Red anal spot of hindwing narrower than in the Mexican form; black postdiscal lunules R²—M¹ on the whole more reduced, while the costal portion of the black postdiscal band is a little wider than in that subspecies.

On the *underside* the red line of the median band continues along M¹, reaching usually the red transverse bar M¹—M², this red bar more or less widely interrupted, being, like the anal red bar, thinner than in *penthésilais*.

Genitalia: ♂. Apex of harpe subtruncate, more obtuse than in *penthésilais*; deflexed dorso-apical ridge less rounded-dilated than in *penthésilais*; central process much shorter, spatulate, strongly dentate at apex; ventral process also much shorter, not reaching ventral edge of valve, curving distad. The clasper figured by Godman & Salvin *l.c.*, is that of this form.

Hab. Guatemala; British Honduras; Honduras; Nicaragua.

In the Tring Museum 12 ♂♂, 1 ♀, from: Vera Paz, Guatemala; San Pedro Sula, Honduras.

c. P. protesilaus leucones subsp. nov.

Papilio protesilaus, Godman & Salv., *Trans. Ent. Soc. Lond.* p. 126. n. 235 (1880) (Sta. Marta).

♂. Resembling *P. p. macrosilaus*. Black dorsal line of abdomen absent (type), or very narrow. Wings, *upperside*.—Forewing: first band thin, stopping short at SM², second band continued to hinder margin or nearly (type), interspace between second and third band of the same width at M as between second and first band; fourth band short; sixth band narrow from R² forward; transparent submarginal space with hair-scales as in Honduras specimens of *macrosilaus*, the wing in costal region less densely scaled than in *archesilaus* and *dariensis*.—Hindwing: red spot large, black postdiscal lunules R²—M¹ ill-defined, shaded with white, white ad- and submarginal interspaces large, especially the submarginal spot R²—R³; edge of wing white, except at tip of veins, but the fringes partly black between C and R²; dentition of wing much less prominent than in the other Colombian forms and the Central American ones.

Underside.—Forewing: postdiscal band more straight from M¹ to SM² than in the allied forms of *P. protesilaus*.—Hindwing: median band half as broad again as subbasal band; black admarginal bars C—R³ thin; white submarginal spot R¹—R² nearly as wide as the admarginal lunule; white submarginal spot R²—R³ twice as broad as the admarginal spot.

Genitalia resembling those of *macrosilaus*, but differ in one or more of the teeth at the ventral edge of the harpe being prolonged, and vertical on the plane

of the clasper. Ventral process of harpe simple, pointed, not reaching ventral edge of clasper; central process spatulate, strongly dentate at apex, the teeth more or less curving dorsad.

Hab. Sta. Marta, North Colombia: 2 ♂♂ in coll. Godman; type from Manaure (F. Simons).

d. P. protesilaus daricensis subsp. nov.

Papilio protesilaus var. *macrosilaus*, Boisduval, *Cons. Lép. Guatem.* p. 6 (1870) (Costa Rica; = *archesilaus* = *Flambé du Pérou* ex errore).

Papilio archesilaus var. *macrosilaus*, Oberthür, *Et. d'Ent.* iv. p. 67. sub n. 182 (1880) (Costa Rica).

Papilio penthesilaus, Godman & Salvin (*non* Felder, 1865, err. det.), *Biol. Centr. Amer., Rhop.* p. 214. n. 40 (1890) (*partim*; Chiriqui; Panama).

Nearest to *archesilaus*, with which it agrees in the black dorsal stripe of the abdomen being broad, in the distal edge of the hindwing being entirely or almost entirely black between C and R¹, in the ventral process of the harpe being denticulate, etc.

Wings less pure white than in *archesilaus*, a little more extended green at base, slightly broader; bands of forewing on the whole thinner, first band always stopping short at SM², second band tapering behind, seldom reaching a little beyond SM², often not extending to this vein, fourth band short, triangular, rarely attaining second cell-fold, sixth band usually well separate from lower angle of cell, evenly curved, not narrowed before R² or only a little, white scaling of cell denser than in *macrosilaus*, the scales being larger both on upper- and underside, hair-scales in submarginal transparent space also broader.—Tooth R² of hindwing on the whole less prominent than in *archesilaus*, the greyish blue admarginal lunules smaller; black admarginal spots C—R² not separated from edge of wing, there being only a small white spot in front of SC² and R¹ appearing as an anterior prolongation of the white lunules standing behind these veins, the fringe remaining usually black also at these small white spots.

On the *underside*, the subbasal band of the forewing narrower than in *archesilaus*; red median line forming a more or less complete ring in apex of cell, as in *archesilaus*, the line continued along M¹, joining the red transverse halfring M¹—M².

♀. Wings pervaded with yellow, especially in anal region of hindwing.

Genitalia: ♂. Harpe on the whole a little shorter than in *archesilaus*; deflexed dorso-apical edge widened proximally, the dilated portion ending distally in a triangular tooth, which is more distal in position than the respective tooth of *archesilaus*; ventral process more or less denticulate on the distal side from base to apex.—♀ not dissected.

Length of forewing: ♂, 43 to 53 mm.; ♀, 47 to 56 mm.

Hab. Costa Rica; Panama: Chiriqui, *type*; islands near the west coast of the Isthmus of Darien: Gobernador, Brava, Jicarón, Cebaco.

The specimens from those islands are partly a transition to *archesilaus*, while the Costa Rica individuals approach *macrosilaus*.

In the Tring Museum 29 ♂♂, 2 ♀♀, from: Carillo, Costa Rica, 3000 ft., October 1904 (A. Hall); Chiriqui: Boquete, Chiriqui, 3500 ft. (Watson); Gobernador I., Jicarón I., Brava I., and Cebaco I., January and February 1902 (J. H. Batty).

e. P. protesilaus archesilaus Feld. (1867) (Pl. IX. fig. 66).

- Papilio archesilaus* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 301. n. 180, p. 345. n. 89 (1864) (Bogota); id., *Reise Novara, Lep.* p. 51. n. 39. t. 11. fig. a. b (1865) (Bogota); Oberth., *Et. d'Ent.* iv. p. 67. n. 182 (1880) (*partim*; Muzo, October); Hahnel, *Iris* iii. p. 203 (1890) (Valera; large insect).
- Papilio protesilaus* var. *d. P. archesilaus*, Kirby, *Cat. Diurn. Lep.* p. 556. sub n. 248 (1871).
- Papilio protesilaus*, Eimer, *Artb. Verwandtsch. Schm.* t. 1. fig. 5 (1889).
- Papilio podalirius* var. *archesilaus*, Staudinger, *Exot. Taf.* i. p. 17 (1884) (Venezuela).
- Papilio ponthesilaus*, Godman & Salvin (*non* Felder, 1865, *err. det.*), *Biol. Centr. Amer., Rhop.* p. 214. n. 40 (1890) (*partim*; Colombia).
- Papilio protesilaus rubrocinctus archesilaus*, Eimer, *l.c.* p. 106 (1889) (Colombia).
- Papilio glaucolaus*, Eimer (*non* Bates, 1864, *err. det.*), *l.c.* p. 107 note (1889).
- Papilio protesilaus rubrocinctus archesilaus glaucolaus*, id., *l.c.* p. 108 (1889) (this form? Panama wrong locality?; on p. 107 "largest *protesilaus*").

♂. Usually larger than *p. protesilaus*, hindwing more strongly dentate, median band of underside of hindwing mostly more distal; the apex of the cell more or less bordered with red inside, ventral process of harpe on the whole more densely denticulate. In the specimens from the Rio Dagua (West Coast) and from the Cauca valley the red line R³—M¹ of the underside of the hindwing is shorter than in individuals from other places, being only a little produced along M¹. The individual variability in the bands appears to be considerable; band 4 of forewing rarely absent, sometimes reaching almost across the cell.—♀ not known to us.

Length of forewing: ♂, 50 to 60 mm.

Hab. Colombia, Northern Venezuela, Western Ecuador.

Eimer, *l.c.*, says under what he terms "*protesilaus rubrocinctus mihi*": "Here belong the large forms which live in the neighbourhood of the Equator, from Colombia to Mexico." The purport of this innocent-looking statement will be understood if one remembers that according to Eimer there is a "law" that the forms of a species are the smaller the farther away from the Equator (non-tropical countries) they live. Now, in the case of *protesilaus* this statement is very unfortunate, inasmuch as the form of *protesilaus* living under or near the Equator (namely in the Amazon valley, East Ecuador and Peru) is smaller than the more northern forms.

In the Tring Museum 114 ♂♂ from: R. Dagua (Rosenberg); "Bogota"; Peperital to Buenavista, January 1897, dry season (Dr. Bürger); Guayaquil, Colombia, January; Paramba, N.W. Ecuador, 3500 ft., March 1897, dry season (Rosenberg); Mocotón and Mérida, Venezuela (Briceño); Campo Alegre, Cumaná, January 1899 (André).

f. P. protesilaus protesilaus L. (1758) (Pl. IX. fig. 67).

- Papilio Eques Achirus protesilaus* Linné, *l.c.* (1758) (*partim*).
- Papilio protesilaus*, Godart, *l.c.* (1819) (*partim*); Boisd., *l.c.* (1836) (*partim*); Lacord., *Ann. Soc. Ent. Fr.* ii. p. 383 (1833) (Guyane); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 9 (1845) (*partim*; Brit. Guiana); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 254 (1854) (Amazons, habits); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 45. n. 168 (1856) (*partim*; R. Demerara); Butler, *Cat. Diurn. Lep. descr. Fabr.* p. 239. n. 21 (1869) (Demerara); Möschl., *Verh. Zool. Bot. Ges. Wien* xxvi. p. 296 (1876) (Surinam; *partim*); Butler, *Ann. Mag. N. H.* (4). xx. p. 127. n. 60 (1877) (Ucayali); id., *Trans. Ent. Soc. Lond.* p. 146. n. 228 (1877) (R. Maués, May; Uraria, May; R. Negro, near Manaos, June); Oberth., *Et. d'Ent.* iv. p. 66. n. 181 (1880) (*partim*; Obydos; Cayenne); Hahnel, *Iris* iii. p. 250 (1890) (Maués); id., *l.c.* p. 283 (1890) (Pebas); Sharpe, *Proc.*

- Zool. Soc. Lond.* p. 555. n. 5 (1890) (R. Araguaya); Godm. & Silv., *Biol. Centr. Amer., Rhop.* p. 213. n. 39 (1890) (*partim*); *id.*, in Whymper, *Andes of Equator, App.* p. 109. n. 93 (1891) (Nanegal); Michael, *Iris* v. p. 214 (1894) (Sao Paulo de Olivença).
Papilio archesilaus, Staudinger (*non* Felder, 1865, *err. det.*), *Exot. Tagf.* i. t. 12 (1884) (Amazons).
Papilio protesilaus var., Staud., *Lc.* p. 17 (1884).
Papilio protesilaus protesilaus, Eimer, *Artb. Verwandtsch. Schm.* p. 104 (1889) (Amazons; Peru; "Brazil" ? alia subsp.).
Papilio puthesilaus, Godm. & Silv. (*non* Felder, 1865, *err. det.*), *Biol. Centr. Amer., Rhop.* p. 214. n. 40 (1890) (*partim*; Peru).
Papilio macrosilaus, Weeks, *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumani).

This form is individually so variable in every locality that none of the slight differences found in specimens from different districts appear to hold good. On the whole the median band of the hindwing below is more proximal in the individuals from the Guianas and the Lower and Middle Amazons than in the Andesian specimens. In many of the Andesian individuals the frons is nearly or quite as extended brown as in the Brazilian subspecies.

The first and second bands of the forewing reach usually beyond SM^2 , sometimes extending to the hindmargin, but there occur also specimens in which both bands stop short at SM^2 . The fourth band extends mostly across two-thirds the cell, often nearly attaining the hindmargin of the cell, sometimes being reduced to a small costal spot. The cell-bands are usually rather heavy in Guiana specimens, the fourth reaching often nearly or entirely across cell. The transparent submarginal interspace bears in costal third, sometimes nearly all over, brown scales instead of white ones, these brown scales occupying on the whole a larger portion of the transparent space than in the preceding geographical forms. The position of the median band of the hindwing is somewhat variable, the Andes specimens agreeing in the position of the band and the extent of the red scaling with *archesilaus*. The apex of the cell of one of our numerous Zamora (Ecuador) examples has the apex of the cell of the hindwing filled in with red scales. In an individual from Rio Demerara, British Guiana, July 1897, the sixth band (postdiscal) of the forewing is much shaded with white behind, not joining the marginal band.

Genitalia: The harpe exhibits also considerable variability. In nearly all the specimens the dorso-apical deflexed ridge is produced into a more or less denticulate triangular tooth of variable dimensions (fig. 3, p. 708); this tooth is occasionally absent, the ridge being rounded-dilated proximally and simply serrate. This reduction of the tooth obtains in our four specimens from Archidona, N.E. Ecuador, and in one of our individuals from the Rio Chuchuras, Huánuco, Peru.

Hab. Oriuoco; the Guianas; Amazons, from Pará to the Andes; Eastern Ecuador; Peru; Bolivia.

In the Tring Museum 220 ♂♂ from: Canra R., various places, February and September to November (S. M. Klages); R. Demerara, August 1897; Aroewarwa Creek, Surinam, July 1905 (S. M. Klages); R. Uanpes, R. Negro; Pozuzo, Huánuco, 800—1000 m. (W. Hoffmanns); R. Chuchuras, afl. of R. Palcazu, 320 m. (W. Hoffmanns); Chanchamayo (W. Hoffmanns; Schunke); Palcazu (Sedlmayr); Cajon, Cuzco, October 1900 (Garlepp); Cuzco, March 1901 (Garlepp); Chirimayo, S.E. Peru, 1000 ft., July 1901, dry season (G. Oekenden); Montanas, Madre de Dios, September 1901 (Oekenden); R. Slucuri, 2500 ft., June 1901 (Oekenden); Salinas, R. Beni, Bolivia, July 1896 (Stuart); Salampioni, Bolivia, 800 m., September 1900 (Simons); Charuplaya, 1300 m., June 1901 (Simons); Mapiiri; S. José de Chiquitos, East Bolivia, July 22, 1904 (J. Steinbach).

g. *P. protesilaus nigricornis* Stand. (1884).

Papilio protesilaus, Godart, *l.c.* (1819) (*partim*; Brazil); Boisd., *l.c.* (1836) (*partim*; Brazil); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 9 (1845) (*partim*; Brazil); Gray, *List Lep. Ins. Brit. Mus.* i. Pap. p. 45. n. 168 (1856) (*partim*; Brazil, Rio de Jan.); Ménétr., *Enum. Corp. Anim. Mus. Petrop.*, *Lép.* i. p. 3. n. 49 (1857) (Brazil); Capronn., *Ann. Soc. Ent. Belg.* xvii. p. 8. n. 1 (1874) (Botafogo, Oct.); Weym., *Stutt. Ent. Zeit.* iv. p. 315. n. 15 (1895) (*partim* ?); Bönningh., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 27 (1895) (Rio, rare; Petropolis more common); Peters, *Illustr. Zeitschr. Ent.* ii. p. 52 (1897) (Nova Friburgo).
Protesilaus leilus Swainson, *Zool. Illustr.* ii. t. 93 (1832) (*fig. supr.*; new name for *protesilaus* L.).
Papilio protesilaus var. *nigricornis* Staudinger, *Exot. Tagb.* i. p. 17 (1884) (S. Paulo, Brazil).
Papilio protesilaus protesilaus, Eimer, *Artb. Verwandtsch. Schm.* p. 104 (1889) (*partim*; Brazil).

Swainson's figure was taken, we think, from a Brazilian specimen, judging from the colour of the antenna and frons. His name *leilus*, however, was proposed to replace Linné's name *protesilaus*, this latter term being employed by Swainson for what he called a **subgenus**. As *leilus* Swains. is, therefore, nothing more than another term for *protesilaus*, it is a synonym pure and simple of *protesilaus*, and cannot be accepted as a name for the particular Brazilian form which Swainson figured.*

♂♀. Antenna brownish black, seldom tawny. Frons brownish black, the sides not being creamy white; this character often met with also among *P. prot. protesilaus* from the Andes.

Genitalia: ♂. Deflexed dorso-apical ridge of harpe dilated into a large denticulate tooth, which is much larger than in the other subspecies; central process spatulate, denticulate at apex; ventral process more or less denticulate.

Hab. East Paraguay; Brazil.

In the Tring Museum 30 ♂♂, 5 ♀♀, from: Yhu, East Paraguay, December 1896 (Andeer); Minas Geraës, February 1901 (A. Kennedy); Tijuco; Petropolis; Rio de Janeiro (E. May); Nova Friburgo; Leme, Sao Paulo; Parana; Leopoldina, S. Catharina; Blumenau.

Together with *P. protesilaus nigricornis* in the same districts and at the same season there occur specimens which differ very remarkably in several points. Two of these specimens from the Province of Parana agree with *P. protesilaus nigricornis*, except in the hindwing being somewhat diffused with yellow, the admarginal and submarginal spots R²—M² being more or less distinctly yellow.

In several other individuals from Parana the yellow diffusion is present in both wings, being especially distinct on the underside of the hindwing, the forewing is practically naked from M² forward, the postdiscal band of the hindwing is broad, etc.

We thought at first that these yellowish individuals were the product of crossing between *P. protesilaus nigricornis* and *P. telesilaus* or *stenodesmus*. But as they do not combine the characters of these species, standing for instance in the broad, straight, black, postdiscal band of the hindwing quite outside the limits of variation of these species, and as they differ also in the genitalia, we can but treat them as belonging to a distinct species, described below. That there are several closely allied species in Brazil occurring in the same district is nothing unusual; but the question of specific distinctness is in this case rendered very difficult to decide from a small series of specimens, since there occur individuals which stand just intermediate between *P. protesilaus nigricornis* and the new species. These individuals have the forewing practically naked from M² forward, have yellow ad- and submarginal spots on the hindwing, etc., as in the new

* See p. 418.

species, but differ from the new species in the harpe being practically like that of *nigricornis*. Moreover, in some of the characters—for instance, the development of the black postdiscal band of the upperside of the hindwing, and the black line along the abdominal edge on the underside of this wing—the specimens incline decidedly towards *nigricornis*. The teeth of the hindwing are, however, on the whole rather more acute than in either *nigricornis* or the new species. In one of these individuals, from Minas Geraës, February, the antennae are tawny, not black; a second specimen from Minas Geraës, August, has unfortunately only a remnant of one antenna, which is black. What are these specimens? Their characters are such that the individuals may be hybrids between the new species and *nigricornis*. Besides the two Minas Geraës specimens we have one from Castro, Parana, September, and two labelled simply "Brazil," all males. Is it likely that we should have received five hybrids, while we got only six specimens of one of the supposed parent species? Moreover, the tawny antenna of one of the Minas Geraës specimens could hardly be explained by assuming the specimen to be the product of two parent-species which have both black antennae. It would be necessary to assume further that in this individual there was also the blood of *P. telesilaus*, which has a tawny antenna. We are inclined to believe that the specimens belong to a third species; they may even be the Atlantic representatives of the insect figured Pl. VI. fig. 29, though they resemble in colour much more Pl. VI. fig. 30. We purposely abstain from giving a name to these individuals, believing it to be much wiser to wait till a larger material has been examined. One necessary desideratum is also the knowledge of the extent of variation of *P. protesilaus nigricornis* during the dry and wet seasons. After our discovery of a slight but distinct difference in the genitalia of the seasonal forms of *Papilio xuthus*,* it would not be very astonishing if some such variability should be proved by breeding to obtain also in *P. protesilaus*. The difference in the density of the scaling of the forewing is a character known to vary with the season in *P. podalirius* and allies.

152. *Papilio helios* spec. nov. (Pl. VI. fig. 30).

♂ ♀. Antenna and frons black as in *P. protesilaus nigricornis*. Wings more or less pervaded with yellow. Forewing transparent, the scaling of the *upperside* dense only from hindmargin to M^2 , but even in this area the scales somewhat reduced in size, not covering one another as in *P. protesilaus*, either rounded at apex, entire, or obtusely bidentate; white scaling between M^2 and costal margin more or less completely fallen off, the scales narrow, those in the distal interspaces between the black bands rather broader than in *P. protesilaus*; first band stopping short at SM^2 , there being only a very few black scales behind this vein; second band mostly reaching beyond SM^2 , but not attaining hindmargin, interspace between these bands wider than that between second and third band; fourth band short or vestigial; fifth band not narrowing to a point at lower angle of cell, postdiscal band closely approaching lower angle of cell, posteriorly almost separated from the marginal band, the white interspace $M^2-(SM^1)$ being obscurely continued to SM^2 .—Hindwing more sharply dentate than in *P. protesilaus nigricornis*, especially at C, SC^2 and R^1 ; black postdiscal band with more or less straight proximal edge, the partitions R^2-M^1 of this band not separate from one another, larger and proximally more sharply defined than in *P. protesilaus*, red anal spot

reaching to M^1 , the black spot M^1-M^2 in front of it more or less distinctly connected with the black postdiscal band, and the white spot M^1-M^2 behind the red one reduced, often to a minute dot; submarginal and marginal spots from R^2 backwards yellow, marginal spots somewhat paler, yellow spot at anal angle not divided, the vein M^2 traversing it being distinctly black only proximally; black submarginal bar R^2-R^3 straight as a rule, the yellow ad- and submarginal spots R^3-M^1 not regularly crescent-shaped, the submarginal one irregularly triangular or trapeziform; most specimens with a black bar behind M^2 in front of the red anal spot.

Underside more yellow than upper. Forewing practically naked from M^2 forwards; the small costal spot between discocellular band and postdiscal one separated from the latter by yellowish scaling, the extreme costal edge remaining black; scales of hinder area entire, not touching one another.—Hindwing: subbasal and median bands a little more widely apart at costal edge and the black postdiscal band broader, therefore the discal area proportionately narrower costally than in *P. p. nigricornis*; red line with distinct white border on **distal** side; thin black submarginal bar R^3-M^1 incomplete, not reaching R^3 , yellow anal spot not separated from spot M^1-M^2 , or incompletely, M^2 being only partially black between these spots or not at all; black arrowhead-shaped spot which stands proximally of red anal bar very little produced basad, being smaller than in *P. protesilaus*; a distinct black line on abdominal fold of male extending from base at least two-thirds to anal angle, this line absent or vestigial in *P. protesilaus*.

Scent-organ as in *P. protesilaus*.

Genitalia: ♂. Deflexed dorso-apical ridge of harpe serrate proximally, not dilated into a large tooth, apex of harpe tapering almost to a point, tip of central process curved proximad in dorsal aspect, teeth vestigial; ventral process reaching edge of clasper, non-dentate.

Length of forewing: ♂, 42 mm.; ♀, 45 mm.

Hab. Brazil.

In the Tring Museum 5 ♂♂, 1 ♀, from: Castro, Parana, December 1898 (E. D. Jones); Parana, name-type.

The white distal border to the red median line of the hindwing below is a remarkable character, which is vestigial in the allied species *P. protesilaus*, *P. telesilaus*, and *P. stenodesmus*, being more distinct in *P. stenodesmus* than in the others. The white border is best noticed in these species if one looks at the hindwing from the upperside, with the eye between specimen and light.

153. *Papilio orthosilaus* Weym. (1899) (Pl. VI. fig. 29).

Papilio orthosilaus Weymer, *Ent. Nachr.* xxv. p. 195 (1899) (Paraguay).

♂. Similar to *P. helios*, larger. Antenna tawny, not black. Frons broadly buff at eyes, not all black.

Wings somewhat narrower than in *P. helios*. *Upperside*: forewing transparent as in *P. helios*; first and second band continued to hindmargin, third band extending just beyond M, the vein itself being black and there being some black scales distally of the vein, fourth band vestigial, discocellular band as in *P. helios*, postdiscal band not so close to lower angle of cell as in *P. helios*, posteriorly a little wider than in that species.—Hindwing: black median band incompletely represented also above from near costal margin to M^1 , a black half-crescent inside the apex of the cell connected with this band; postdiscal band

broad, much broader than in *P. helios*, admarginal and submarginal spots yellowish, but paler than in *P. helios*, all small, yellow anal marginal spot separated from submarginal spot M^1-M^2 , the vein M^2 being black; red anal spot very large, yellowish spot M^1-M^2 behind it reduced to a minute bar, black spot M^1-M^2 contiguous with the red patch; blue spots R^3-M^2 rather large, but not sharply defined proximally; marginal teeth $C-R^2$ sharp, distal edge of wing black from C to tail, there being only a minute yellowish spot close to the margin in front of tail.

Underside more green at base than in *P. helios*; anal and subanal pinkish spots of hindwing large; black line along abdominal edge extending to anal angle, postdiscal band broad, yellowish ad- and submarginal spots narrow.

♀ not known.

Scent-organ as in *P. protesilaus*.

Genitalia as in *P. helios*, but apical lobe of harpe much shorter and broader, rounded at apex; ventral process also shorter.

Hab. Paraguay; Brazil.

A ♂ in coll. Weymer, from Paraguay. The type-specimen, also from Paraguay, is no longer in coll. Fruhstorfer; we have been unable to find out in which collection it is now contained; the bands, especially the marginal one of the forewing, are narrower than in our figure, according to a sketch which Herr G. Weymer has kindly sent us.

The ♂ here figured is from Goyaz, Brazil, in coll. Oberthür.

154. *Papilio stenodesmus* spec. nov. (Pl. IX. fig. 68).

♂♀. Antenna black. Frons white at sides. Transparent area of forewing much more extended than in *P. protesilaus* and *P. telesilaus*, the opaque (densely white-scaled) area reaching from hinder margin to M^2 , not entering cell; the scales of this opaque space narrow, sinuate, becoming more and more narrow towards cell and in basal half of cell, assuming a hairlike shape in the apical half of the wing; the white scales at the costal edge between the black bands about the same size as those in the posterior area of the wing; the hairlike scales of the transparent spaces usually fallen off to a great extent; the scales of the black bands about twice or three times as long as broad, denticulate, some narrow; scaling of *underside* as above, but transparent spaces practically denuded of scales, the sockets of the scales, however, being present; scales larger than above and entire from M^2 to inner margin, except distally; seven comparatively thin black bands, the first not quite reaching inner margin, stopping at SM^3 , the second extending usually beyond SM^2 , but never reaching inner margin, a little more oblique and therefore posteriorly more distal than in *telesilaus*; interspace between these two bands about half as wide again as that between second and third band, the latter stopping at M , fourth band reduced to a costal spot, usually triangular, rarely reaching halfway across the cell, fifth and sixth bands usually touching each other at lower angle of cell, seldom here $1\frac{1}{2}$ mm. distant, sixth always reaching to hinder angle, here joining the marginal band; transparent submarginal band reaching costally beyond SC^3 and posteriorly beyond M^2 , there being in black costal border a thin transparent streak before SC^3 .—Hindwing more elongate than in *P. protesilaus* and *P. telesilaus*, often slightly yellow; the marginal teeth R^2 , M^1 and M^2 longer, submarginal spots R^2-M^2 pale yellow, paler

than in *P. telesilaus*; median band of *underside* a little curved, crossing cell closer to apex than in *P. protesilaus* and *P. telesilaus*.

Neuration and scent-organ as in *P. protesilaus*.

Genitalia: ♂. Tenth tergite narrow, trilobate at apex, a little longer than in *P. protesilaus*; apical lobe of harpe broad, obtuse or pointed, about two and a half or three times as long as broad in middle, finely denticulate at convex apical edge and in middle of ventral margin, deflexed dorso-apical edge not dilated; ventral process reaching ventral margin of elasper, central process pointed in dorsal view, the tip being curved proximad.—♀ not dissected.

Early stages not known.

Hab. Paraguay; Brazil.

A combination of black antenna, white (or greyish) sides of the frons, broad interspace between the first and second black bands of the forewing, and a strongly dentate hindwing is not met with in the allied species. The frons of the Brazilian *P. protesilaus*, which has black antennae, is nearly as black at the sides as in the centre; and *P. telesilaus*, small specimens of which resemble *P. stenodesmus*, has always tawny antennae.

We have seen specimens said to be from outside the range as given above. But as they were obtained from a Continental dealer, we do not believe that the localities are authentic, and therefore abstain from publishing them.

In the Tring Museum 68 ♂♂, 1 ♀, from: Sapucay, Paraguay, August to October 1901 and 1904 (W. Foster), *type*; Yhu, Paraguay, September—December 1896 (Andeer); Rio de Janeiro (E. May); Petropolis, December 1897 (Foetterle); Leme, S. Paulo, February and March 1898; Bahuru, S. Paulo (Dr. Hempel); S. Paulo, August 1884 (E. D. Jones); Castro, Parana, September 1898 (E. D. Jones); Espiritu Santo, September 1896 (Foetterle); S. Catharina; Blumenau.

155. *Papilio earis* spec. nov. (Pl. VI. fig. 32).

♂. Frons buffish white at sides. Antenna dark tawny. Abdomen beneath more or less ochraceous. Wings pervaded with buff, especially on the *underside*, which is mostly washed with pink.

Forewing: first band stopping at SM^2 , second prolonged a little beyond that vein or also stopping short at it; interspace between these bands a little narrower than the interspace between second and third bands; fourth band reduced to a costal dot; sixth close to lower angle of cell, narrower from R^2 forwards than backwards.—Hindwing: red anal spot elongate, extending to near M^1 proximally, black bar in front of it restricted to cellule M^1-M^2 ; black postdiscal spots R^2-R^3 luniform, narrow, more or less distinctly separate from spot R^3-M^1 ; ad- and submarginal interstitial spots buffish, narrow; dentition of wing rather more sharp than in *P. prot. protesilaus*.

Underside: ad- and submarginal buffish spots of hindwing smaller than in *P. p. protesilaus*, upper two more or less washed with brown, submarginal buffish bar R^1-R^2 very thin; white distal border of red anal bar wider than in the form just mentioned, the black arrowhead spot on abdominal fold not reduced as in that form.

Scent-organ as in *P. protesilaus*.

Genitalia: Deflexed dorso-apical ridge of harpe slightly widened, with some teeth; ventral process simple, not reaching ventral edge of elasper, somewhat

curving apical; central process broad, short, spatulate, heavily dentate, the teeth somewhat curving basad, the process bearing one or two teeth on the ventral side near the base.

♀ and early stages not known.

Hab. Ecuador: Zamora, 3000—4000 ft. (O. T. Baron), *type*; Zaruma, 1000 m., June 1899, wet season (Simons); three ♂♂ in the Tring Museum.

Judging from the genitalia, it appears to us possible that *P. caris*, *P. orthosilaus* and *P. helios* may turn out to be geographical races of one species. However, the material examined is as yet quite insufficient to decide the question.

156. *Papilio telesilaus* Feld. (1864).

Papilio Eques Achirus protesilaus, Jablonsky & Herbst (*non* Linné, 1758, *err. det.*), *Naturs. Schm.* iii. p. 147. n. 97. t. 43. fig. 3. 4 (1788) ("Carolina & Jamaica," *errore*).

Princeps heroicus protesilaus, Hübner, *Samml. Ecot. Schm.* i. t. 108 (1806—?).

Iphiclides protesilaus, id., *Verz. bek. Schm.* p. 82. n. 834 (1818?).

Papilio protesilaus, Godart, *Enc. Méth.* ix. p. 50. n. 73 (1819) (*partim*).

Papilio telesilaus Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 301. n. 179 (1864) (Amazonia; Nova Granada; Brasilia austral.).

♂♀. Body and wings more pervaded with yellow than in *P. protesilaus*. Antenna always tawny, though varying in depth of colour. Frons always yellowish white at sides.—Forewing less densely scaled in costal area than in South American *P. protesilaus*, the small scales falling easily off, the anterior and discal portions of the wing appearing naked, glossy; first and second bands closer together than second and third in nearly every specimen; fourth band sometimes reaching as far as third cell-fold, usually very short, often reduced to a dot, not rarely absent; sixth band close to lower angle of cell, which it touches in many specimens, more or less reduced in width from this angle of cell forwards, this costal portion sometimes practically separate from the posterior portion, the latter then being continuous with the discocellular band.—Hindwing: submarginal spots R²—M² buffish yellow, often the whole anal region strongly pervaded with yellow above and below; blue admarginal scales entire, or some with small teeth.

Scent-organ: hair-scales long, but decidedly shorter and broader than in *P. protesilaus*.

Genitalia: ♂. Deflexed dorso-apical ridge of harpe not or very little dilated, not enlarged into a tooth; ventral process reaching ventral edge of clasper; central process either simple or bearing at the base on the ventral side a dentate ridge, the apex being in this case also strongly dentate.—♀ not dissected.

Early stages not known.

Hab. Panama to Southern Brazil and Paraguay.

a. P. telesilaus dolius subsp. nov.

Papilio protesilaus var. *macrosilaus*, Bates (*non* Gray, 1852, *err. det.*), *Proc. Zool. Soc. Lond.* p. 241. n. 2 (1863) (Panama).

Papilio telesilaus, Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 215. n. 41 (1890) (Panama; "S. America" *alia* subsp.).

♂. First band of forewing not continued along SM³ to hinder margin, stopping short at SM².—Fringe of hindwing more extended white between C and R² than in the following form, black postdiscal lunules R²—M¹ on the whole smaller, the black submarginal bar R²—R³ reaching R³ halfway between the black postdiscal

and marginal lunules R^2-M^1 ; subbasal band of *underside* not entering apex of basal cellule.

Genitalia: Deflexed dorso-apical ridge of harpe very narrow, hardly at all dentate; central process slender, without basal dentate ridge, apex often entire, non-dentate, never so strongly dentate as in the following form.

Hab. Panama and west coast of Colombia; *name-type* from the Rio Dagua, West Colombia.

In the Tring Museum 14 ♂♂ from: Panama (Salvin); R. Dagua (W. F. H. Rosenberg).

b. P. telesilaus telesilaus Feld. (1864).

Papilio Eques Acheus protesilaus, Jablonsky & Herbst (*non* Linné, 1758, err. det.), *l.c.*

Princeps heroicus protesilaus, Hubner, *l.c.*

Papilio protesilaus, Godart, *l.c.* (1819) (*partim*); Kollar, *Denkschr. K. Ak. Wiss. Wien. Math. Nat. Cl. i. p. 352. n. 2* (1850) (*syn. partim*); Möschl., *Verh. Zool. Bot. Ges. Wien* xxvi. p. 296 (1876) (Surinam; *partim*); Auriv., *K. Sr. Vet. Akad. Handl.* xix. 5. p. 29. n. 28 (1882) (*Recensio critica*; sub *synon.*).

Papilio protesilaus var. a., Gray, *Cat. Lep. Ins. Brit. Mus.* i. p. 34. sub. n. 160 (1852) (Brazil).

Papilio telesilaus Felder, *l.c.* (1864) (Amazonia; Nova Granada; Brasilia austral.); Druce, *Proc. Zool. Soc. Lond.* p. 245. n. 13 (1876) (Ucayali); Staud., *Exot. Tuff.* i. p. 17 (1884) (Amazons); Eimer, *Arb. Vereindtsch. Schm.* p. 104. t. 1. fig. 6 (1889); Hahnel, *Iris* iii. p. 250. 253 (1890) (Maués); id., *l.c.* p. 283 (1890) (Pebas); Michael, *Iris* v. p. 214 (1894) (Sao Paulo de Olivença); Eimer, *Orthogen.* p. 21 (1897).

Papilio protesilaus, Linn., var. b. *P. telesilaus*, Kirby, *Cat. Diurn. Lep.* p. 556. sub n. 248 (1871).

Papilio protesilaus var. *telesilaus*, Oberthür, *Et. d'Ent.* iv. p. 66. sub n. 181 (1880) (Pará; Cayenne); Möschl., *Verh. Zool. Bot. Ges. Wien* xxxii. p. 304 (1883) (Surinam; in one specim. red anal spot absent from upperside); Maass. & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 24. sub n. 110 (1890) (west side of Cordillera of Bogota); iid., *l.c.* p. 82. n. 51 (1890) (Upper Amazons).

Papilio protesilaus telesilaus, Eimer, *l.c.* p. 47. 48 (1897).

Cosmodesmus telesilaus, Kirby, in Hübn., *Samml. Exot. Schmett.* ed. ii. p. 93. t. 108. fig. 1. 2 (190—?).

♂ ♀. First band of forewing continued along SM^3 ; subbasal band of hindwing below entering basal cellule.

The specimens from Brazil have on the whole thinner black bands than the individuals from the Andes, Amazons and Guianas, the median band of the hindwing is often a little more distal, and both wings are more frequently conspicuously pervaded with yellow.

There is considerable variability in the width of the wings as well as in the size of the markings in the distal area of the hindwing.

Genitalia: Deflexed dorso-apical ridge of harpe distinctly widened, dentate; central process spatulate, dentate, the teeth standing on the dorsal side, and being more or less curved, a conspicuous dentate ridge on the central process at its base.

Hab. Colombia: Magdalena valley eastwards; Venezuela; the Guianas; Amazons; Eastern Ecuador to Bolivia; Paraguay; Brazil as far south as Rio Grande do Sul.

In the Tring Museum 110 ♂♂, 2 ♀♀, from: "Bogota": Villavicencio to Rio Ocoor, January 1897 (Dr. Bürger); Temblador, Snaipure, and La Union, Cauca R., Orinoco, February, June, September and October (S. M. Klages); R. Demerara, August 1898; Essequibo R.; Aroewarwa Creek, Maroewym valley, Surinam, June and July 1905 (S. M. Klages); Manicoré; Thomár; Obidos; R. Uanpes, Upper R. Negro; R. Napo (W. Goodfellow); Archidona, N.E. Ecuador (W. Goodfellow); R. Cachyaco, affl. of R. Huallaga (Stuart); R. Chuchuras, affl. of R. Palcazu, 320 m. (W. Hoffmanns); Palcazu (Sedlmayr); Peréné R.; Prov. Sara, S. Cruz de la Sierra, February—April 1904 (J. Steinbach); S. José de Chiquitos, East

Bolivia, July 1904 (J. Steinbach); Sapucay, Paraguay, September 1902 (W. Foster); Yhu, East Paraguay, December 1896 (Andeer); Villa Maria to Diamantino, Matto Grosso, January 1897 (Andeer); Minas Geraçs, February 1899 and 1901 (A. Kennedy); Petropolis; Rio de Janeiro (E. May); Bahuru, S. Paulo (Dr. Hempel); S. Catharina; Blumenau.

XVI. *Thyastes* Group.

This group is very closely related to the following one, the two together contrasting rather strongly with the previous group in pattern as well as structure. The genitalia of the *Thyastes* and *Dolicoon* Groups are practically the same, the differences between the species being very slight in these organs. The females are even rarer in collections than those of the *Protosilaus* Group.

Six species :

- | | |
|--|------------------|
| a. Hindwing below with a tawny band on disc | Species No. 157. |
| Hindwing below with a line of red spots on disc | b. |
| b. Forewing with row of sharply marked submarginal spots
in apical area | c. |
| Forewing without sharply marked submarginal spots in
apical area | Species No. 162. |
| c. Hindwing, on upperside, with a yellow spot M^1-M^2
beside the marginal anal spot | Species No. 158. |
| Only the marginal spot present. | d. |
| d. Pale discal area of forewing not reaching to lower angle
of cell | Species No. 159. |
| Pale discal area of forewing reaching to lower angle
of cell | e. |
| e. Submarginal spot R^2-R^3 of forewing distant from discal
area, or absent | Species No. 160. |
| Submarginal spot R^2-R^3 of forewing contiguous with
spot R^2-R^3 of discal area, always present. | Species No. 161. |

157. *Papilio marchandi* Boisd. (1836).

Papilio marchandi Boisduval, *Spec. Gén. Léop.* i. p. 350. n. 192 (1836) (Mexico); Strecker, *Lep. Rhop. Het.* p. 25. t. 4. fig. 2 (1873) (Panama; Costa Rica; Honduras); Godm. & Salv., *Biol. Centr. Amer.*, *Rhop.* ii. p. 218. n. 46. t. 68. fig. 5. harpe (1890) (East and South Mexico; Guatemala; Brit. Honduras; Costa Rica; Panama; Colombia); Haase, *Untersuch. Mimicry* i. p. 83 (1893) (Colombia; Guatemala).

♂♀. Instead of the discal row of red spots on the underside of the hindwing of the allied species *P. marchandi* bears a tawny band, the wing being more or less washed with the same colour distally of the black subbasal band and along the abdominal fold. The tail is broadly bordered with yellow from base to tip on hindside. Individual variability obtains on the forewing especially in the size of the yellow submarginal spots and in the upper discal spots, of which spot R^1-R^2 is usually absent or vestigial, and on the hindwing in the size of the black bands of the underside. Some of the specimens from Ecuador and Colombia exhibit an interesting character on the upperside of the hindwing. The upper three yellow bars belong to the admarginal series, the fourth spot, which stands on a level

with the third, belonging to the submarginal series. In the specimens referred to there are from one to three submarginal bars between C and R².

Scent-organ: wool brown; scales beneath the wool somewhat elongate, narrowed towards apex, mostly truncate or feebly bidentate, partly entire.

Genitalia: ♂. No ventral process on valve; central ridge of harpe widest above, obliquely truncate, without a row of teeth across its lateral surface.

Early stages not known.

Hab. Mexico to West Ecuador.

Two subspecies.

a. P. marchandi marchandi Boisduval (1836).

Papilio marchandi Boisduval, *l.c.* (Mexico); Doublt., *List Lep. Ins. Brit. Mus.* i. p. 16 (1845) ("Brazil," errore); id., Westw. & Hew., *Gen. Diurn. Lep. i.* p. 17, n. 164 (1846) (Mexico); Gray, *Cat. Lep. Ins. Brit. Mus. i. Pap.* p. 38, n. 189 (1852) (Guatemala; "Brazil," errore); id., *List Lep. Ins. Brit. Mus. i. Pap.* p. 52, n. 197 (1856) (Guatemala); Weidem., *Proc. Ent. Soc. Philad.* ii. p. 147 (1863) (Mexico; Centr. Amer.); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 300, n. 172 (1864) (Guatemala); Lucas, *Ann. Soc. Ent. France* p. 532 (1869) (Cordoba, Orizaba; Guatemala); Boisduval, *Consid. Léop. Guatem.* p. 5 (1870) (Honduras; Mexico); Kirby, *Cat. Diurn. Lep.* p. 555, n. 242 (1871) (Guatemala); Strecker, *l.c. (partim; Honduras)*; Kirby, *l.c.* p. 811, n. 242 (1877); Oberth., *Et. d'Ent.* iv. p. 75, n. 236 (1880) (Mexico); Staud., *Exot. Tagg.* i. p. 18 (1884) (Centr. Amer.); Godm. & Salv., *l.c. (partim; East & West Mexico; Guatemala; Brit. Honduras)*; Haase, *l.c. (partim; Guatemala)*.

♂♀. The tawny discal band of the underside of the hindwing is usually somewhat curved anteriorly; its black or brown proximal border is narrow as a rule, but is sometimes as broad as, or even broader than, the tawny band between SC² and R³; the pale central area is usually rounded off. The submarginal spot R²—R³ on the upperside of the hindwing is small in most specimens, the admarginal bar at its outer side is vestigial or absent, and the submarginal spot R³—M¹ is small or absent.

Genitalia: Apical edge of harpe with a few more teeth than in the following form.

Hab. West and East Mexico; Guatemala; Brit. Honduras; "Honduras" (*teste* Boisduval); presumably also in Nicaragua.

In the Tring Museum 11 ♂♂ from: Orizaba (Bilimet); Guatemala (Salvin).

b. P. marchandi panamensis Oberth. (1880).

Papilio marchandi var. *panamensis* Oberthür, *Et. d'Ent.* iv. p. 75, sub n. 236 (1880) (Panama).
Papilio marchandi, Strecker, *l.c. (partim; Costa Rica; Panama)*; Butl. & Druce, *Proc. Zool. Soc. Lond.* p. 365, n. 374 (1874) (Costa Rica); Godm. & Salv., *l.c. (partim; Costa Rica; Panama; Colombia)*; Haase, *l.c. (partim; Colombia)*.

♂. The yellow markings of the upperside on the whole paler, but sometimes deeper yellow, than in certain Central American specimens (does the colour darken with age?); the yellow submarginal spots R²—M² of the hindwing larger, spot R³—M¹ being always distinct and the admarginal bar R²—R³ never (?) absent; the yellow discal band of the forewing deeper incised on the veins above and below; the black bands of the underside of the hindwing rather wider, the tawny discal band more straight, the pale central area less rounded distally, and the wing narrower between R¹ and R², the distance from apex of cell to tip of R¹ being somewhat shorter in *P. m. panamensis* than in *P. m. marchandi*. None of these characters are constant, the two forms completely intergrading.

Hab. Costa Rica to West Ecuador.

In the Tring Museum 20 ♂♂ from : Carillo, Costa Rica, 3000 ft., October 1904 (A. Hall); Chiriqui; R. Dagua, West Colombia (Rosenberg); "Bogota"; Pambelar and Paramba, West Ecuador; Cachabi, W. Ecuador, low country, January 1897 (Rosenberg).

158. *Papilio thyastes* Drury (1782).

Papilio Eques Achirus thyastes Drury, *Illustr. Exot. Ins.* iii. p. 47. t. 35. and *Index* (1782) (Rio de Janeiro); Fabr., *Ent. Syst.* iii. 1. p. 26. n. 77 (1793).

Iphiclides diaphorus Hübner, *Samml. Exot. Schm.* ii. t. 93 (1820?).

Papilio thyastes, Godart, *Enc. Méth.* ix. p. 54. n. 83 (1819) (Brazil).

♂. Similar to *P. calliste*; ground-colour of upperside varying from maize- to chrome-yellow: one red anal spot on hindwing, a spot M^1-M^2 occasionally vestigial; yellow submarginal spot R^3-M^1 much smaller than spot M^1-M^2 . Red bars R^3-M^2 of underside of hindwing broken up into dots. Hairs on frons short. Yellow dorso-lateral line of abdomen broader than the black lateral line.

Scent-organ: wool buffish, scales beneath it denticulate, mostly broad, those in front of fold mostly entire, acuminate.

Genitalia: . No ventral process on clasper; central ridge of harpe almost square, its ventral angle not produced basad, the tooth at this angle large, conical; no row of teeth across the lateral surface.

♀ and early stages not known.

Hab. Ecuador to Bolivia; Brazil.

Three subspecies.

The most striking feature in the pattern of *P. thyastes* and *P. calliste* appears to us to be the development in different directions of the yellowish ad- and submarginal spots R^3-M^2 in the hindwings of the two species. In *P. calliste* there are on the *upperside* of the hindwing no ad- and submarginal spots M^1-M^3 or only traces of them, while *P. thyastes* has a large submarginal spot M^1-M^2 . On the other hand, in cellule R^3-M^1 there is in *P. calliste* a large submarginal spot and a sharply defined admarginal curved bar, *P. thyastes* bearing in this cellule only a reduced submarginal spot. A similar contrast is observed on the underside of the two insects. We find in *P. thyastes* between the discal area of the forewing and the so-called submarginal line a yellowish line which represents the true submarginal interspaces; on the hindwing there is a corresponding row of spots between C and R^2 . These markings are entirely lost in *P. calliste*, while in this species the admarginal spots R^2-M^2 , which are vestigial in *P. thyastes*, are large.

a. *P. thyastes thyastinus* Oberth. (1880).

Papilio thyastinus Oberthür, *Et. d'Ent.* iv. p. 75. n. 235. t. 2. fig. 3 (1880) (Ecuador); Hahnel, *Iris* iii. p. 282 (1890) (Pebas); Michael, *ibid.* v. p. 214 (1894) (Sao Paulo de Olivença).

Papilio thyastes, Staudinger, *Exot. Tagf.* i. p. 18. t. 12 (1884) (Pebas, *thyastinus* = *thyastes*); Haensch, *Berl. Ent. Zeitschr.* xlvii. p. 154 (1903) (Archidona, 640 m.).

♂. Submarginal spot R^2-R^3 of forewing separate from the discal spot; discal band usually broadly interrupted at R^3 ; first submarginal spot absent from upperside or ill-defined. Apex of cell of hindwing black.

In some of our Peruvian specimens the subapical cell-bar of the forewing, above, and the discal costal bar are interrupted. The position of the central red spots on the underside of the hindwing is variable; many specimens have an additional red spot situated in the cell. One Peru specimen has the spots buffish pink instead of bright red.

Hab. North-East Ecuador to East Central Peru; Upper Amazons.

In the Tring Museum 30 ♂♂ from: Coca, R. Napo, May—August 1899 (W. Goodfellow); R. Chuchuras, afl. of R. Palcazu, 320 m (W. Hoffmanns); Palcazu (Sedlmayr); Pozuzo (W. Hoffmanns); Iquitos; Pebas.

b. P. thyastes zoros subsp. nov.

♂. Like the preceding; but first submarginal spot of upperside of forewing sharply defined. In the majority of specimens the upper outer angle of discal patch R^2-M^1 of forewing not rounded off, the apex of the cell of hindwing a little less extended black than in *P. th. thyastinus*, and the yellow patch at base of cellule R^2-M^1 longer. The individuals of *thyastinus* from the Upper Amazons and the eastern slopes of the Peruvian Andes completely connect the Ecuador form with the Bolivian one.

Hab. S.E. Peru; Bolivia (*name-type* from Mushay).

In the Tring Museum 10 ♂♂ from: S. Domingo, Carabaya, 4500 ft. (G. Ockenden); Mushay, R. Beni, March 1895 (Stuart); Mapiri.

c. P. thyastes thyastes Drury (1782).

Papilio Eques Achivus thyastes Drury, *l.c.* (Rio de Janeiro).

Iphiclides diaphorus Hübner, *l.c.*

Papilio thyastes, Godart, *l.c.*; Boisd., *Spec. Gén. Léop.* i. p. 349. n. 191 (1836) (Brazil); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 17 (1845) (Brazil); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 163 (1846) (Brazil); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 38. n. 188 (1852) (Brazil); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 52. n. 196 (1856) (Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petr.*, *Léop.* i. p. 4. n. 61 (1857) (Brazil); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 300. n. 173 (1864) (Bras. austr.); Butl., *Cat. Diurn. Lep. descr. Fabr.* p. 239. n. 20 (1869) (Brazil); Kirby, *Cat. Diurn. Lep.* p. 555. n. 243 (1871) (Brazil); Oberth., *Et. d'Ent.* iv. p. 75. n. 234 (1880) (Brazil); Staud., *Exot. Tagf.* i. p. 18 (1884) (Southern Brazil); Haase, *Untersuch. Mimicry* i. p. 83 (1893).

Iphiclides thyastes, Kirby, in Hübn., *Samml. Exot. Schmett.* ed. ii. p. 94. t. 307. fig. 1. 2 (190-?).

♂. Paler than the Andesian forms, with a slightly greenish tint in the yellow colour; discal band of forewing not interrupted at R^3 , or only the vein itself black, submarginal spot R^2-R^3 merged together with the respective discal spot, or (rarely) the two spots separated by a very narrow black line. Black distal border of hindwing not entering cell; most specimens with a minute red dot M^1-M^2 on upperside, which is rarely marked in the Andesian forms.

Genitalia: Central dentate ridge of harpe smaller than in the other forms; dorso-apical ridge more densely hairy on proximal side.

Hab. Brazil.

No representative of *P. thyastes* is known from Paraguay, Matto Grosso, the Middle and Lower Amazons and the Guianas.

In the Tring Museum 16 ♂♂ from: Bitalha, S. Paulo; Castro, Parana (E. D. Jones); S. Catharina; Blumenau.

159. *Papilio dioxippus* Hew. (1855).

Papilio dioxippus Hewitson, *Exot. Butt.* i. *Pap.* t. 2. fig. 3. 4. ♂ (1855) (N. Granada); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 52. n. 198 (1856); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 300. n. 170 (1864) (Bogota); Kirby, *Cat. Diurn. Lep.* p. 555. n. 240 (1871) ("var." excl.); Hopff., *Stett. Ent. Zeit.* xl. p. 47. n. 2 (1879) (*partim*; N. Granada); Oberth., *Et. d'Ent.* iv. p. 75. n. 233 (1880) (Muzo; Carare); Staud., *Exot. Tagf.* p. 17 (1884) ("Peru bis Columbien" errore); Haase, *Untersuch. Mimicry* i. p. 83 (1893).

One of the commonest *Papilios* in Bogota collections. It is known from the Cauca and Magdalena valleys, and occurs also on the eastern side of the Cordillera of Bogota. The insect comes very close to *P. lacandonensis*. As we know as yet nothing of the occurrence of *P. lacandonensis* in Colombia, and as *dioxippus* is apparently restricted to that country, it is not impossible that *dioxippus* may turn out to be the Colombian representative of *lacandonensis*. However, as the *lacandonensis* form which occurs from Ecuador to Bolivia agrees both in structure and pattern closely with the Central American form, it is hardly probable that the Colombian *dioxippus*, which differs in structure and pattern from both *lacandonensis* forms, is a third form of the same species.

♂. Forewing with two to five submarginal spots; discal area often reaching beyond R^3 , but never up to R^2 ; the two distal posterior spots in cell usually merged together, rarely quite separated from one another; the brown excision, at the base of M^1 , of the yellowish discal area is seldom absent (for instance, in type specimen). The purplish white submarginal spots R^2-M^2 on the underside of the hindwing are always present, the posterior one being, however, often much reduced.

Scent-organ: wool creamy; scales beneath it mostly entire, truncate, apically broader than in *P. marchandi*.

Genitalia: Upper angle of dentate ridge of harpe rounded.

♀ and early stages not known.

Hab. Colombia: Magdalena and Cauca valleys; Llanos of Rio Meta.

In the Tring Museum 140 ♂♂ from: "Bogota"; Muzo, December 1896; Pereira, Cauca.

In coll. Godman from: Cauca valley (Ribbc); Quindia, 4000 ft. (Wheeler); Muzo; Llanos de R. Meta (Child).

160. *Papilio lacandonensis* Bates (1864).

Papilio lacandonensis Bates, *Ent. Mo. Mag.* i. p. 4. n. 6 (1864) (Guatemala).

♂. Near *P. dioxippus* Hew. (1855), with which it apparently occurs together in Colombia. The yellowish discal area of the forewing extends anteriorly to R^2 or beyond; the remnant of the yellowish subapical cell-band stands distally of base of R^3 , being widely separate from the cell-spot which precedes it at hinder edge of cell. The hindwing is proportionately longer than in *P. dioxippus*, the pale submarginal spot M^1-M^2 of the underside absent or just vestigial, and the cell narrower.

Scent-organ as in *P. dioxippus*; the white scales beneath the wool and discally of the fold rather broader and mostly rounded at apex.

Genitalia as in *P. dioxippus*, but the upper angle of the dentate ridge acuminate, not rounded.

♀ and early stages not known.

Hab. Guatemala to Bolivia; two subspecies.

a. *P. lacandonensis lacandonensis* Bates (1855).

Papilio lacandonensis Bates, l.c. (Guatemala); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 216. n. 43. t. 67. fig. 11. 12. ♂, 13. harpe (1890) (Guatemala; Pauama; "Ecuador; Peru" alia subspecies).

Papilio lacandonensis (?), Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 300. n. 169 (1864) (Guatemala; cit. falsa).

Papilio dioxippus var. a. *P. lacandonensis*, Kirby, *Cat. Diurn. Lep.* p. 555. sub n. 240 (1871) (Guatemala).

Papilio dioxippus, Hopffer, *Stett. Ent. Zeit.* xl. p. 47. n. 2 (1879) (*partim*; Guatemala).

Four submarginal spots on forewing, thin, the first usually vestigial; yellowish discal area extended beyond R^2 , spot R^2-R^3 truncate at R^2 ; subapical posterior cell-spot about 5 mm. long, reaching from R^3 nearly to angle of cell; distal marginal border narrower at M^1 than yellowish discal area.—Yellowish ad- and submarginal spots of hindwing shaded with brown, small; whitish submarginal spots R^2-M^1 of underside vestigial or very small.

Hab. Guatemala; Panama.

In the Tring Museum: 2 ♂♂ without precise locality.

In coll. F. D. Godman a series of males.

b. P. lacandones diores subsp. nov.

Papilio lacandones, Godman & Salvy, *Biol. Centr. Amer., Rhop.* ii. p. 216. n. 43 (1890) (*partim*; Cururai, Ecuador, and Cosnipata, Peru).

♂. Wings a little broader than in *l. lacandones*. Forewing: five submarginal spots, larger than in the preceding form, spot SC^3-SC^1 distinct, spot R^2-R^3 seldom vestigial; yellowish discal area a little straighter distally, slightly incised on the veins, stopping at R^2 , the spot R^2-R^3 triangular, not truncate at R^2 ; subapical posterior cell-spot small, about as large as submarginal spot R^1-R^2 , usually less than half the respective cell-spot of *l. lacandones*.—Ad- and submarginal yellowish spots of hindwing larger above and below, especially the whitish submarginal spots R^2-M^1 of underside, upper bars nearer edge of wing than in *l. lacandones*.

Hab. Ecuador; Peru; Bolivia (*name-type* from R. Slucuri).

In the Tring Museum 14 ♂♂ from: Chanchamayo (W. Hoffmanns); R. Slucuri, S.E. Peru, 2500 ft., June 1901, dry season (G. Ockenden); Chirimayo, S.E. Peru, July 1901, dry season, 1000 ft. (G. Ockenden); S. Domingo, S.E. Peru, 4500—6000 ft., July—August 1901 (G. Ockenden); La Pampa, R. Huacamayo, 2500 ft., November 1904 (G. Ockenden); Mapiri, Bolivia.

161. *Papilio calliste* Bates (1864).

Papilio calliste Bates, *Ent. Mo. Mag.* i. p. 3. n. 5 (1864) (Guatemala).

Papilio lorzac Boisduval, *Insect. Agric.* p. 103 (1869) (Guatemala).

♂. Nearest to *P. dioxippus* and *P. lacandones*. Hairs of frons long. Pale dorso-lateral line of abdomen narrow. Pale bands and spots of wings greenish yellow or primrose-colour. Submarginal line of spots of forewing curved, spot R^2-R^3 of this line confluent with the respective spot of the discal band. Hindwing, above, with two red spots, sometimes with traces of a third dot R^3-M^1 ; while the ad- and submarginal greenish yellow spots R^2-M^1 are strongly developed, there are only slight traces of such spots between M^1 and M^2 .

On the *underside* of the hindwing the yellowish and whitish spots at and near the distal edge are merged together, forming a pale border to the wing; red spot M^1-M^2 bordered with white in front like the anal one, not divided into dots.

Scent-organ as in *P. lacandones*, a portion of the scales beneath the wool rather strongly bidentate.

Genitalia: ♂. No ventral process on valve; central ridge of harpe widest above, with large teeth at edge, ventral edge not produced basad, no row of teeth across lateral surface.

Female and early stages not known.

Hab. Mexico to Costa Rica.

Two subspecies.

a. *P. calliste calliste* Bates (1864).

Papilio calliste Bates, *l.c.* (Guatemala); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 300. n. 171 (1864) (Guatemala; cit. falsa); Kirby, *Cat. Diurn. Lep.* p. 555. n. 241 (1871) (Guatemala); Staud. *Exot. Tagf.* i. p. 18 (1884) ("northern Centr. Amer."); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 217. n. 45. t. 68. fig. 1. 2 (1890) (Atoyac, Mexico; Guatemala; Brit. Honduras;—"Costa Rica" alia subsp.); Haase, *Untersuch. Mimicry* i. p. 83 (1893) ("N. Granada" errore; Guatemala).

Papilio lorzæ Boisduval, *l.c.* (Guatemala).

♂. Forewing, *above*: apical cell-band and the following band clearly marked; postmedian cell-band also present, but usually more or less shaded with brown in middle, while the submedian cell-band is vestigial, being rarely distinct; discal area excised on cell-side between M^1 and M^2 , the sinns rounded, an indication of a sinns also between R^3 and M^1 ; outer edge of discal area slightly irregular; a distinct submarginal spot R^3-M^1 . Black distal area of hindwing entering or touching cell; yellowish marginal spot M^1-M^2 distinct.

On *underside*, the submarginal line of forewing continued to SM^2 .

Hab. Mexico: Jalisco; Guatemala; British Honduras.

In the Tring Museum 15 ♂♂ from: Motzorougo, Mexico; Polochic valley, Guatemala; "Guatemala."

b. *P. calliste olbius* spec. nov.

Papilio calliste, Butler & Druce, *Proc. Zool. Soc. Lond.* p. 365. n. 373 (1874) (Costa Rica; this form according to specimen in coll. Godman); Oberth., *Et. d'Ent.* iv. p. 75. n. 237 (1880) (Costa Rica); Godm. & Salv., *l.c.* (*partim*; Costa Rica).

♂. A little larger than the preceding. Forewing, *upperside*: submedian cell-band absent, postmedian one much shaded with brown, only an anterior and a posterior spot being clearly marked, subapical cell-band also shaded with brown in middle; discal costal band very thin except costally; discal area wider than in the preceding subspecies, its distal edge more straight, the sinns M^1-M^2 on costal side reduced; submarginal spot R^3-M^1 vestigial.—Hindwing: black distal area narrower than in *calliste* in front, not widening costad, not touching cell; black basi-abdominal band also a little narrower; yellowish marginal spot M^1-M^2 vestigial.

Underside.—Submarginal line of forewing vestigial from M^1 to hindangle; the bands less distinctly washed with sulphur-yellow than in the preceding.—Hindwing: brown discal band of almost even width from costal margin to M^1 , not triangular.

Hab. Costa Rica.

In the Tring Museum 4 ♂♂ from: Cachi, Costa Rica, May 1901 (Underwood), *type*; Carillo, Costa Rica, 3000 ft., October 1904 (A. Hall).

162. *Papilio leucaspis* Godt. (1819).

Papilio leucaspis Godart, *Enc. Méth.* ix. p. 55. n. 85 (1819) (Peru?); Grimsh., *Trans. Roy. Soc. Edinb.* xxxix. 1. p. 8 (1897) ("type" from Dufresne collection).

♂. Frons all brown-black, hairs long. Abdomen black above, pale lateral line vestigial, buff-yellow or clay-colour beneath. Brown area of wings paler than in *P. dioxippus*, *thyastes*, etc. Cell-folds of forewing distinct; greenish straw-yellow cell-bars represented by spots situated at costal margin and at hinder side of cell; discal area triangular, stopping short at R^2 , but there is usually a small dot in front of this vein; a spot in front of subcostal fork as in *P. dioxippus*; brown marginal area with deep brown or (beneath) black lines which are more distinct beneath than

above, four in number, the two middle ones confluent costally.—Greenish straw-yellow area of hindwing triangular, extending beyond apex of cell; abdominal fold brown; a red line from R^2 to abdominal edge, interrupted at the veins, the line of spots continued to costal margin on underside.

Scent-organ: Wool buffish, scales beneath it denticulate, mostly asymmetrical, those in front of fold mostly short, truncate, feebly denticulate.

Genitalia: Central dentate ridge of harpe narrowed at base, widest above, longer than broad, the dentate edge incassate, bearing conical teeth, no row of teeth across its lateral surface; no ventral process on clasper.

♀ and early stages not known.

Hab. Colombia to Bolivia.

Two subspecies.

a. P. leucaspis lamis subsp. nov.

Papilio leucaspis, Hewitson, *Exot. Butt.* i. *Pap.* t. 2. fig. 5 (1855) (Colombia); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 300. n. 168 (1864) (*partim*; Bogota); Kirby, *Cat. Diurn. Lep.* p. 555. n. 239 (1871) (*partim*; Colombia); Oberth., *El. d'Ent.* iv. p. 75. n. 232 (1880) (Toquiza and Llanos de San Martin, Colombia); Staud., *Exot. Tagf.* i. p. 17 (1884) (*partim*; Colombia).

♂. Forewing somewhat distinctly falcate; posterior spots of cell large, very distinct also below, the subapical one at least as long as the interspace between the two spots. The red spots of the upperside of the hindwing and the yellow submarginal spot R^2 — R^3 on the whole somewhat larger than in the following subspecies.

Hab. Colombia: Magdalena valley, presumably also Canca valley.

A specimen from Frontino, Antioquia (T. K. Salmon), in coll. Goldman, approaches in the size of the cell-spots Ecuadorian examples of *P. l. leucaspis*.

In the Tring Museum 12 ♂♂ from: "Bogota"; Antioquia.

b. P. leucaspis leucaspis.

Papilio leucaspis Godart, *l.c.* (Peru?); Boisd., *Spec. Gén. Léop.* i. p. 349. n. 190 (1836) (Peru?); Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vii. p. 50 (1838) (Peru); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 162 (1846) (Peru?); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 38. n. 187 (1852) (Peru?); id., *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 52. n. 195 (1856) (Peru?); Felder, *l.c.* (*partim*; Ecuador); Kirby, *l.c.* (*partim*; Ecuador); Hopff., *Stett. Ent. Zeit.* xl. p. 47. n. 1 (1879) (Peru); Staud., *l.c.* (*partim*; Peru); Maass. & Weym., in Stübel, *Reisen S. Amer.*, *Lep.* p. 64. n. 91 (1890) (Huamboya); iid., *l.c.* p. 80. n. 14 (1890) (N. Peru); Haensch, *Berl. Ent. Zeitschr.* xlvii. p. 154 (1903) (Archidona, 640 m.); Weeks, *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumani).

♂. The spots in the cell of the forewing small, generally absent from the underside or vestigial, the interspace between the two posterior spots much wider than in the preceding subspecies, the subapical spot standing about halfway between lower angle of cell and R^3 ; this spot on the whole larger in Ecuadorian specimens than in Peruvian and Bolivian ones. Many individuals have in front of R^2 a small discal dot, which does not appear to be ever present in *P. l. lamis*.

The specimen (name-type) in the Royal Scottish Museum belongs to this form.

Hab. Eastern Ecuador to Bolivia.

In the Tring Museum 100 ♂♂ from: Zamora (Gaujon, and O. T. Baron); Pozuzo, Hnáuco, 800—1000 m. (W. Hoffmanns); Chanchamayo (Schunke); Huancabamba, Cerro de Pasco (E. Böttger); Caradoc, Marcapata, 4000 ft., February 1901 (G. Oekenden); R. Inambari, S.E. Peru, July 1900, 1000 m. (Simons); R. Slucuri, S.E. Peru, June 1901, 2500 ft. (G. Oekenden); Oroya to Limbaní

Carabaya, S.E. Peru, January 1901 (G. Oeckenden); S. Domingo, Carabaya, 4500—6000 ft., January 1901 (G. Oeckenden); Charnplaya, Bolivia, 1300 m., June 1901 (Simons).

XVII. Dolicaon Group.

One of the most interesting features of this group is the anastomosis according to species of one or of two subcostal veins of the forewing with the costal vein. The character appears to be constant within most species.

The scent-organ is practically the same in all the species. The wool consists of long and very thin hairs which are widest in the centre. The fold is densely scaled beneath the wool.

Six species:

- | | |
|---|------------------|
| a. Forewing with broad black band across cell joining the black distal border | b. |
| The band across cell not reaching to distal border | c. |
| b. Underside of hindwing with two pale postdiscal spots R ² —M ¹ separated from the greenish white basi-discal area by a brown band | Species No. 163. |
| These spots absent | Species No. 164. |
| c. Veins SC ¹ and SC ² of forewing confluent with C | d. |
| Only vein SC ¹ of forewing confluent with C | e. |
| d. Black distal border of hindwing narrow; a narrow discal band on underside from costal margin to anal spot | Species No. 166. |
| Black distal border of hindwing very broad; a short discal band on underside from costal margin to distal border, which it reaches before middle | Species No. 165. |
| e. A red anal spot on hindwing | Species No. 167. |
| No red anal spot on hindwing | f. |
| f. Wings greenish white above | Species No. 168. |
| Wings creamy buff above | Species No. 169. |

163. *Papilio serville* Godt. (1824).

Papilio serville Godart, *Enc. Méth.* ix. *Suppl.* p. 809. n. 46-7 (1824) (Amer. merid.).

Papilio servillei (!), Boisduval, *Spec. Gén. Léop.* i. p. 346. n. 187 (1836) (America).

♂. The only reliable difference between this insect and *P. columbus* Kollar which we can find is the presence, on the underside of the hindwing in *P. serville*, of two pale spots R²—M¹, which are separated from the pale basi-discal area by a black-brown band.

If the whole range of *P. serville* is taken into consideration, the characters by which the two insects are usually distinguished in books do not hold good. The clayish lateral streak on the abdomen, the brown streaks in the cell of the forewing, the dots on the underside of the head and on the breast, which are said to characterise *P. serville*, are not always present in the specimens of this species from Venezuela and Colombia. More constant in all localities, but by no means quite constant, is the slightly different position of the short greenish costal band of the forewing, situated proximally of the subcostal fork, this band being more oblique in *P. columbus* than in *serville*; and further, the colour of the submarginal area of the underside of the forewing, which is more purplish white in *columbus* than in *serville*, the black streaks in this area, moreover, being more prominent in *serville* than in

columbus. The clayish streak on the underside of the abdominal fold is more distinct in *serville* than in *columbus*.

The clasping organs are individually somewhat variable in both insects. We have not found any distinction between the two species in these organs.

The specimens of *P. serville* from Venezuela are the most interesting. They look exactly like a cross between Colombian *serville* and Colombian *columbus*. However, as *P. columbus* is not known from Venezuela, there can be no question of hybridisation, to which describers so often resort in order to get easily over difficulties.

Godart did not know from which locality the type came. Hitherto Colombian specimens have usually been regarded as typical. This is apparently erroneous; though Godart's description, being taken from a single specimen,—probably lost: Boisduval, *l.c.*, says that he had seen the type, but does not add anything to Godart's description,—is naturally not so precise as to enable us to say with absolute certainty from which country the type came. However, there is one point in his description which bears on this question. The abdomen is said to be like that of *P. dolicaon*. Now, in *P. dolicaon* the pale stripes of the abdomen are always broad. This is the case only in the southern subspecies of *P. serville*. Therefore we have to accept as typical the southern form of *serville*, not the northern. The Colombian insects were not yet known at Godart's time; all the very common Colombian forms have been described later. The South American species of the *Enc. Méth.* were from Brazil, Surinam (and Guyane), and from Peru. We may therefore safely assume that the specimen of *P. serville* also came from Peru. The "Peru" of that time, however, included what became Bolivia in 1825. Therefore it is impossible to say whether the Peruvian specimens came from what is now termed Peru, or whether they came from some part of the present-day Bolivia.

Neuration: SC¹ and SC² of forewing confluent with C, SC³ seldom free.

Genitalia: Ventral process of clasper minute; central ridge of harpe a half-crescent, acuminate ventrally and dorsally, the ventral angle being produced basad.

♀ and early stages not known.

Hab. Northern Venezuela, Colombia to Bolivia.

Two subspecies.

a. P. serville acritus subsp. nov.

Papilio servillei, Gray (*nou* Godart, 1824, *err. det.*), *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 36. n. 174 (1852) (Colombia); *id.*, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 48. n. 182 (1856) (*partim*); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 300. n. 166 (1864) (Bogota; Venezuela); *id.*, *Reise Novara*, *Lep.* p. 49. n. 38 (1865) (Bogota); Kirby, *Cat. Diurn. Lep.* p. 555. n. 238 (1871) (Colombia; "var." excl.); Butl. & Druce, *Proc. Zool. Soc. Lond.* p. 364. n. 371 (1874) ("Costa Rica" errore); Oberth., *Et. d'Ent.* iv. p. 74. n. 230 (1880) (Colombia); Maass & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 24. n. 108 (1890) (west side of Cordillera of Bogota); *id.*, *l.c.* p. 36. n. 38 (1890) (Guayabo, Cauca); Haase, *Untersuch. Mimicry* i. p. 84 (1893).

♂. Dots on head and breast usually small, sometimes absent; abdomen often all black, the clayish lateral stripe absent or thin. The cell-streaks on forewing often absent, seldom heavy. The pale submarginal spot C—SC² on underside of hindwing standing usually in middle between distal margin and pale basi-discal area.

Hab. Northern Venezuela; Eastern and Central Colombia; *name-type* from Venezuela.

In the Tring Museum 28 ♂♂ from: Tachira, Venezuela (Briceño); Mocotóné, Venezuela (Briceño); "Bogota"; Muzo, December 1896; Casanare, October 1898.

b. P. serrille serrille Godt. (1824).*Papilio serrille* Godart, *l.c.**Papilio serrillei*, Boisduval, *l.c.*; *id.*, *Bull. Soc. Ent. France* p. 153 (1874) (distinct from *hippodamus*; Ecuador); Hopff., *Stett. Ent. Zeit.* xl. p. 47. u. 3 (1879) (Chanchamayo; dist. from *hippodamus*); *Staud., Exot. Tagf.* i. p. 17 (1884) (Peru; Ecuador); Haenseb., *Berl. Ent. Zeitschr.* xlvii. p. 154 (1903) (Archidona, 640 m.).*Papilio serrillae* (?), Lucas, in Guér., *Dict. Pitt. Hist. Nat.* vii. p. 50 (1838) (hab?).*Papilio boliviana* Weeks, *Illustr. Diurn. Lep.* p. 20 (1905) (Chulumani; this insect? *nomen nudum*! dealer's name?).

♂. Dots on head and breast always present; abdomen always with two pale stripes on each side, the upper one being broad. Cell-streaks of forewing heavier than in *P. s. acritus*; the subapical cell-patch always washed with brown. The pale patches in the distal area of the underside of the hindwing on the whole more distinct, and the upper one of them nearer the basi-discal area than in *acritus*; the hindwing on an average less elongate.

Hab. Western Colombia: Cauca; Ecuador to Bolivia.

In the Tring Museum 110 ♂♂ from: Archidona (W. Goodfellow); Loja; Zamora (O. T. Baron); Chanchamayo (W. Hoffmanns; Selunke); Marcapata, 4500 ft.; Pozuzo, Huánuco (W. Hoffmanns); Perené R. (Simons; Watkins & Tomlinson); S. Domingo, La Union, and Oroya, Carabaya (G. Ockenden); Hnancabamba, Cerro de Pasco, Junin (E. Böttger); Chulumani, Bolivia, January 1901 (Simons); R. Tanampayo, Bolivia (Garlepp).

164. *Papilio columbus* Kollar (1850).*Papilio columbus* Kollar, *Denkschr. K. Ak. Wiss. Wien, Math. Naturw. Cl. i.* p. 351. n. 1. t. 42. fig. 1. 2 (1850) (Rio Meta).

Papilio hippodamus Doubleday, *List Lep. Ins. Brit. Mus.* i. p. 9 (1845) (*nomen nudum*, Colombia); *id.*, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 15. n. 134 (1846); *id.*, *l.c.* ii. p. 529 (1852) (*hippodamus* synonym of *serrillei* = *columbus* Koll.); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 300. n. 167 (1864) (Bogota; "Venezuela," errore); Boisduval, *Bull. Soc. Ent. France* p. 153 (1874) (distinct from *serrillei* = *columbus*); Oberthür, *Et. d'Ent.* iv. p. 74. n. 231 (1880) (Muzo; Carare); Maass & Weym., in Stübel, *Reisen S. Amer., Lep.* p. 32. n. 136 (1890) (Colombia); Prinz, Theresa, *Berl. Ent. Zeitschr.* xlvi. p. 241. n. 5 (1901) (Bogota, bought).

Papilio serrillei, Gray, *Cat. Lep. Ins. Brit. Mus., Pap.* i. p. 36. n. 174 (1852) (*partim*).

Papilio burtoni Reakirt, *Proc. Acad. Nat. Sci. Philad.* p. 89. n. 55 (1868) (Issagasuga, Colombia); Strecker, *Lep. Rhop. Het.* p. 15 (1873) (= "*columbus* Hew." errore); *id.*, *l.c. Suppl.* iii. p. 17 (1900) (type; = *hippodamus*).

Papilio serrillei var. *a. P. hippodamus*, Kirby, *Cat. Diurn. Lep.* p. 555. sub n. 238 (1871) (Colombia; Venezuela).*Papilio hippodamus* var. *fulva* Oberthür, *Et. d'Ent.* iv. p. 74. sub n. 231 (1880) (Muzo).*Papilio serrillei* Godt. var. *hippodamus*, Standinger, *Exot. Tagf.* i. p. 17. t. 12 (1884) (North Colombia; Venezuela); Haase, *Untersuch. Mimicry* i. p. 84 (1893).

The name *hippodamus* can unfortunately not stand for this species. The name appears first in Doubleday's *List* of 1845, where it is a mere *nomen nudum*, placed between *P. agesilaus* and *P. philoxenus*, not the slightest indication being given as to what kind of *Papilio* the name was meant to designate. In Doubleday's "Genera" of 1846 the name again appears as a *nomen nudum*, here standing between (*ajax* =) *marcellus* and *bellerophon*; but we gather from a note by Oberthür, *l.c.* (1880) and a reference given by Felder, *l.c.* (1864), to a figure in Doubleday's "Genera," that some copies of the first number of the "Genera"—advance copies no doubt—were distributed which contained a plate without number on which were figured *P. evan*, *hippodamus* and *polyuctes*. We do not think that this plate can

be considered "published." In the Appendix to the "Genera" (1852) Westwood says that *hippodamus* is the same as *serville*, and that also *columbus* Kollar is a synonym of the same. This is the first published statement of what *hippodamus* is like, though the statement is in so far erroneous, as *hippodamus* cannot be identical with *serville* as well as with *columbus*, these two names applying to two different species. The first description of *hippodamus* was given by Felder in 1864, Kirby, in his Catalogue, enumerating for this reason the insect as *hippodamus* Felder. As the *nomen nudum* of 1845 and 1846 (*hippodamus*) cannot supersede the name *columbus* of 1850, we have to employ the latter name for the present insect. Kirby, *l.c.*, appears to have sunk *columbus* Kollar as a synonym of *hippodamus* not because *hippodamus* had in his opinion a claim to priority, but because there is another *Papilio* called *columbus* by Hewitson, which name Kirby dates also 1850. However, Hewitson's name was published in 1851—*i.e.* after Kollar's *columbus*.

This species has a very restricted range, being found only in Colombia and North-west Ecuador. Kollar, and after him Felder, *ll.c.*, gave Venezuela as habitat. However, the type came from the Rio Meta, eastern side of the Cordillera of Bogota, no specimens from Venezuela proper being known.

The black distal area of the hindwing is usually separated from the cell, but occasionally touches it, though it never enters it, as the band so often does in *P. serville*. The size of the small greenish costal band of the forewing and of the subapical cell-patch is very variable. In one of our specimens the anal spot of the hindwing is not red, but nearly as pale as the ground-colour of the wing. Oberthür, *l.c.*, mentions a similar colour-aberration as *ab. fulva*.

The female resembles the male, the black bands being a little less extended.

Hab. Colombia: Cordillera of Bogota to west coast; North-west Ecuador.

In the Tring Museum 140 ♂♂ from: R. Dagua (Rosenberg); Canca (Child); Pereira, Canca; "Bogota"; Muzo, December 1896; Lita, W. Ecuador, 3000 ft. (Flemming & Miketta); Paramba, W. Ecuador, 3500 ft., March 1897 (Rosenberg); Paramba, January—May 1898 (Flemming & Miketta).

A female in coll. Adams from the Cauca valley, the only one which we have seen.

In coll. Godman from: Muzo; Llanos de Rio Meta; Frontino, Antioquia.

165. *Papilio orabilis* Butl. (1872).

Papilio orabilis Butler, *Cist. Ent.* i. p. 84 (1872) (Costa Rica).

♂. Similar in appearance to *P. serville* and *columbus* Kollar (1850, *non* Hew. 1851), but easily recognised by the club of the antenna being black, seldom slightly tawny, by the black median band of the forewing stopping short at or before M², not joining the distal black border, the cell of the forewing being proportionately longer, the red spot M¹—M² of the hindwing being well marked above and below, etc.

Genitalia: ♂. Ventral process of clasper much larger than in *P. serville* and *columbus*, central ridge of harpe wider, proximal ventral edge of harpe not produced basad.

♀ and early stages not known.

Hab. Guatemala to West Colombia.

The occurrence in Guatemala requires confirmation.

Two subspecies.

a. P. orabilis orabilis Butl. (1872).

Papilio orabilis Butler, *l.c.*; id., *Lep. Exot.* p. 163. t. 58, fig. 1 (1874); id. & Druce, *Proc. Zool. Soc. Lond.* p. 365. n. 372 (1874) (Costa Rica); Kirby, *Cat. Diurn. Lep.* p. 813. n. 380 (1877) (Costa Rica); Staud., *Exot. Tuff.* i. p. 17 (1884); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 216. n. 42. t. 67. fig. 14. ♂, 15. genit. (1890) (Guatemala; Costa Rica; Panama.—“Colombia” alia subsp.).

♂. The black oblique discal band of the hindwing not marked on the upperside, only shining through from below. Discal spot R^1 — R^2 of forewing, upperside, usually absent, oblique black median band often not reaching M^2 , the portion between cell and M^2 being shaded with greenish white, especially often in Costa Rica specimens.

Hab. Guatemala (a specimen in the Berlin Museum, doubtful?); Costa Rica; Ngaba and Chiriqui, Panama.

In the Tring Museum 8 ♂♂ from: Carillo, Costa Rica, June—July 1903 (Underwood); Carillo, 3000 ft., October 1904 (A. Hall); Volcan de Chiriqui, 5000—8000 ft. (Watson).

b. P. orabilis isocharis subsp. nov.

Papilio orabilis, Godman & Salv., *l.c.* (*partim*; Colombia).

♂. *Upperside*.—Forewing: black median band always extending to M^2 ; distal border a little wider than in *P. o. orabilis*; greenish white discal spot R^1 — R^2 always present.—Hindwing: black distal border wider than in the preceding form, sending out obliquely forward a spur corresponding to the oblique band of the underside, the spur not reaching beyond SC^2 (a similar spur found in *P. iphitas*, *doliceon*, etc.).

Underside.—The pale postdiscal band situated in the brown-black distal border narrower than in the Central American subspecies.—Hindwing: submarginal innules R^2 — M^1 rather larger.

Clayish streaks of abdomen on the whole narrower than in *P. o. orabilis*.

Hab. West Colombia.

In the Tring Museum 8 ♂♂ from R. Dagna (W. F. H. Rosenberg).

A long series in coll. Charles Oberthür from Juntas, R. Dagna.

166. *Papilio salvini* Bates (1864).

Papilio salvini Bates, *Ent. Mo. Mag.* i. p. 4. n. 8 (1864) (Guatemala); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 301. n. 174 (1864) (cit. falsa); Hew., *Exot. Butt.* iii. *Pap.* t. 8. fig. 23 (1865); Boisd., *Consid. Lép. Guatem.* p. 5 (1870) (Yucatan; Costa Rica); Kirby, *Cat. Diurn. Lep.* p. 555. n. 244 (1871); Oberth., *Et. d'Ent.* iv. p. 67. n. 183 (1880) (Guatemala; “Mexico”); Godm. & Salv., *Biol. Centr. Amer., Rhop.* ii. p. 217. t. 68. fig. 3. ♂, 4. genit. (1890) (Yucatan; Guatemala; Brit. Honduras); Haase, *Untersuch. Mimicry* i. p. 85 (1893) (near *bellerophon*, errore).

Papilio eacus Hewitson, *l.c.* (Boisd. *MS.*).

In appearance reminding one of *P. bellerophon*, of which *salvini* has generally been considered a near ally; but the species is in point of fact a relative of *P. orabilis* and *callias*.

♂. Body as in *P. callias* and *P. doliceon*. Antenna tawny. Cell of forewing long, as in *P. columbus* Kollar (1850, non Hewitson 1851) and *orabilis*; the same kind of pattern, but the black cell-bar narrow, not extending beyond cell, at right

angles to costal edge, greenish white discal band much wider and longer than in *P. callias* and *orabilis*.—Black distal marginal border of hindwing narrower than in the allied species; yellowish white admarginal lunules R²—M² regularly curved, not interrupted in middle. Scales of upper layer of fore- and hindwing (except costal area of the latter) narrow.

Underside glossy, excepting posterior area of forewing, where the scales are entire and have an opaque appearance.—Forewing: brown discocellular band continued to M² or beyond, remaining separate from the narrow brown distal border, the interspace having become white (secondarily).—Hindwing: brown discal band from costal margin nearly straight to red anal spots, corresponding to the costal portion of the forked band of *P. callias* and the inner arm of the fork, the outer arm of the fork being indicated in *P. salvini* by a slight projection from the band before R²; brown distal border about as broad as the discal band.

Neuration: SC¹ and SC² of forewing confluent with C, the tip of C curving towards SC².

Genitalia: A broad denticulate ventral process on clasper; central ridge of harpe narrowed apicad, without a row of teeth transversely across the lobe; ventral proximal edge of harpe not produced basad.

♀ and early stages not known.

Hab. Mexico, Yucatan; Guatemala; British Honduras.

The locality Yucatan requires confirmation.

In the Tring Museum 9 ♂♂ from: Vera Paz, Guatemala; "Guatemala."

167. *Papilio callias* nom. nov.

Papilio columbus Hewitson (*non* Kollar, 1850), *Trans. Ent. Soc. Lond.* (2). i. p. 80. t. 10. fig. 1 (1851) (Villa Nova, Amazons); Doubl., Westw. & Hew., *Gen. Diurn. Lep.* ii. p. 529 (1852) (Amazons); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 36. n. 175 (1852) (Amazons); Wall., *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Amazons); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 49. u. 183 (1856) (Amazons); Bates, *Trans. Ent. Soc. Lond.* (2). v. p. 348 (1861) (Villa Nova, November; Ega; R. Japura); id., *Journ. Ent.* i. p. 229. n. 32 (1862) (Upper Amazons); id., *Natural. Riv. Amaz.* p. 156 (1864); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 300. n. 161 (1864) (Villa Nova; Ega; R. Japura); Kirby, *Cat. Diurn. Lep.* p. 554. n. 236 (1871) (Amaz. sup.); Oberth., *Et. d'Ent.* iv. p. 74. n. 229 (1880) (Teffé); Staud., *Exot. Tagg.* i. p. 16. t. 11 (1884) (Rio Maués to Ecuador and Peru); Hahnel, *Iris* iii. p. 250 (1890) (Maués); id., *l.c.* p. 283 (1890) (Pebas); Haase, *Untersuch. Mimicry* i. p. 84 (1893) (Amazons); Michael, *Iris* vii. p. 214 (1894) Sao Paulo de Olivença).

Though Westwood as well as Gray and Felder, *l.c.*, give Kollar's *columbus* priority over Hewitson's *columbus*, they accept nevertheless the name *columbus* for the later discovered insect. We think they were guided in doing this by the Fabrician habit in nomenclature of employing again in the same genus for another species a name which is a synonym, *columbus* Kollar being treated by those authors as a synonym of *hippodamus*. Kirby, *l.c.*, dates both *columbus* Hew. and *columbus* Kollar from 1850, in which he is wrong, the former being published in 1851. The present species, therefore, has no valid name.

♂. Body clayish white beneath, with the usual black lines on abdomen; clayish dorso-lateral stripe of abdomen broad. Antennae brownish black (Haase, *l.c.*, erroneously describes the club as tawny).

Wings, *upperside*: forewing subtransparent apically, the scales being reduced in width; pattern nearest to that of *P. dolicaon*, greenish white area distally almost

evenly rounded; short costal discal band usually stopping short at R^1 , never extending beyond R^2 , variable in width from 1 to 4 mm.—Hindwing shorter than in *P. salvini*, *orabilis*, *dioxippus*, etc., but distinctly triangular, dentate, tooth R^2 usually prolonged to a short tail, tail R^3 thin; black distal marginal area produced discal on veins R^2 and following, usually a black bar on disc in front of and again behind SC^2 corresponding to the discal band of underside; red anal spot varying from being large and rounded to being transverse and thin.

On *underside* the most interesting character in pattern is the black forked discal band of the hindwing; the proximal branch usually touches apex of cell, being seldom so far proximal that the extremity of the cell is occupied by a spot of the ground-colour. The outer branch is short, joining the distal marginal area at R^2 . The greenish white interspaces between the two branches vary much in width, being sometimes shaded over with brown. The development of the two branches in the allied species is peculiar: in *P. salvini* the outer branch has disappeared, in *P. orabilis*, *serville*, and *columbus* Kollar (1850) the inner branch has become obliterated, being often indicated by a thin line between R^2 and R^3 , and in *P. dolicaon* and *iphitas* both branches are preserved, but the proximal one has been shifted basad, standing at right angles (or nearly) to the abdominal margin. Now, in the female of *callias* the whole band is shifted distad, crossing R^2 about 3 mm. from cell; the costal interspace between the band and the distal border is practically absent, there being just a pale shadow between C and SC^2 , and the spots of the ground-colour between the two branches of the band are reduced to small spots of a buffish tint.

♀. Besides the difference in the discal band of the hindwing as just mentioned, the female differs from the male in the black cell-band of the forewing being narrowed to a point. The red anal spot of the upperside is large; the greenish white spot M^1 — M^2 standing near the red spot is surrounded with black, being separated from the greenish white basi-discal area, which is occasionally the case also in male.

Neuration: SC^1 of forewing joining C; SC^2 free.

Genitalia: ♂. No ventral process on clasper; ventral proximal angle of harpe produced basad; central ridge with transverse dentate ridge.—♀ not dissected.

Early stages not known.

Hab. East Ecuador; Peru, eastwards to Oyapock R., Lower Amazons.

In the Tring Museum 30 ♂♂ from: Coca, R. Napo, May—July 1899 (W. Goodfellow); R. Chuchuras, affl. of R. Palcazu, 320 m. (W. Hoffmanns); Palcazu (Sedlmayr); Pozuzo (W. Hoffmanns); R. Uanpes, Upper R. Negro.

Two ♀♀ from R. Oyapock in Mus. Göldi, Pará, one of which has been kindly transferred to the Tring Museum by the owner.

168. *Papilio dolicaon* Cram. (1775).

Papilio Eques Achivus dolicaon Cramer, *Pap. Erot.* i. p. 25. t. 17. fig. C, D. (1775) (East Indies!).

Though there are considerable differences between *P. dolicaon* and *serville*, the two species have much in common.

♂. Head and breast black, dotted with white; abdomen buffish clay-colour, black lines usually broader basally than apically. Apex of antenna tawny ochraceous,

—Forewing: black patch across cell oblique, continued anteriorly to base; greenish white subapical interspace of cell often washed with black on upperside, as in *P. serrille*; a row of three to six spots distally of cell from costal margin to R^3 , rarely a spot behind R^3 , the spots more or less elongate, separate; on underside this row of spots replaced by a very broad, glossy, purplish buff band, which usually extends to M^2 or beyond.—Hindwing broader and shorter than in *P. serrille*, costal margin not much shorter than distal margin; black distal border broad, usually dentate at some of the veins, dilated between SC^2 and R^1 in most specimens, a spot of the ground-colour being isolated between these veins; a row of pale blue admarginal dots, two in each cellule, those between C and R^1 usually absent or vestigial; two rows of such spots on underside; no red anal spot; black discal band crossing cell at M^2 , the branch across cell standing at right angles (or nearly) to the costal portion, which is about parallel to abdominal margin; tail thin, apex buff yellow.

♀ like male, larger, black distal areas of both wings and cell-band of forewing, as well as the greenish white discal costal band of spots on forewing, reduced.

Neuration: SC^1 of forewing confluent with C; SC^2 free.

Genitalia: ♂. Clasper without ventral process, or the process vestigial; proximal ventral angle of harpe somewhat produced basad; central ridge regularly dentate, the teeth conical, especially those along the proximal edge, a short transverse row near ventral angle.—♀ not dissected.

Early stages not known.

Hab. Colombia to Paraguay and Brazil.

a. P. dolicaon hebrus subsp. nov.

Papilio dolicaon, Standinger, *Exot. Tagf.* i. p. 18 (1884) (*partim*; Antioquia, Colombia).

♂. Black ventral mesial line of abdomen broad.—Wings, *above*: forewing more obtuse at apex than in the other forms; white subapical cell-band narrow, narrowing costad, sometimes reduced to a point at costal margin or abbreviated; discal spots long, spot R^2 — R^3 always present, rarely a dot behind R^3 ; veins M^1 and M^2 more extended black than in the following forms.—Hindwing more rounded, resembling the wing of *P. iphitas*; white spot SC^2 — R^1 within the black distal border always distinct, the black spot or line separating it from the basi-discal area usually smaller than the white spot.

Underside.—Pale distal area of forewing and the hindwing more purple than in the other subspecies.—Forewing: pale distal area more restricted, the veins R^1 to M^1 traversing it very heavily black, separating the band into patches, the patches M^1 — M^2 being small or vestigial.—Hindwing more or less obviously washed with ochreous, especially in anal region; black discal band broad, especially the costal portion and the cell-band; pale blue admarginal dots large, buffish patches C— R^1 outside black discal band rather sharply defined.

Hab. Colombia; known to us from the Magdalena valley, and the Llanos of the Rio Meta, east side of the Cordillera of Bogota.

The form found in "Bogota" collections, usually confounded in collections with *P. d. deileon*.

In the Tring Museum 16 ♂♂ from "Bogota."

In coll. F. D. Godman from the Llanos of R. Meta.

b. P. dolicaon deileon Feld. (1865).

- Papilio deileon* Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 300. n. 163 (1864) (Bogota; *nom. nud.*); id., *Reise Norara, Lep.* p. 48. n. 37 (1865) (Bogota); Staud., *Exot. Tagf.* i. p. 18 (1884) (S.E. Peru).
- Papilio dolicaon*, Wallace, *Trans. Ent. Soc. Lond.* (2). ii. p. 255 (1854) (Amazons); Bates, *ibid.* (2). v. p. 348 (1861) (Pará to Peru); id., *Journ. Entom.* i. p. 228. n. 31 (1862) (sparingly throughout the Amazons); Druce, *Proc. Zool. Soc. Lond.* p. 245. n. 11 (1876) (Ucayali); Butl., *Trans. Ent. Soc. Lond.* p. 146. n. 229 (1877) (R. Jutahi, February); Staud., *Exot. Tagf.* i. p. 18. t. 12 (1884) (*partim*; Amazons); Hahnel, *Iris* iii. p. 250 (1890) (Maués); id., *l.c.* p. 183 (1890) (Pebas).
- Papilio dolicaon* var. a. *P. deileon*, Kirby, *Cat. Diurn. Lep.* p. 555. sub n. 237 (1871) (Colombia).

♂. Black distal border of hindwing, *underside*, thin from R¹ backwards, 1 to 2 mm. broad at R²; black discal band of hindwing crossing cell at base of M², the point of origin of this vein situated within the band, the patch of ground-colour in apex of cell much larger than the patch situated at base of cellule SC²—R¹.

The subapical greenish white cell-band of the forewing, *upperside*, usually strongly shaded with black in the specimens from East Central Peru, and the discal spots SC³—R³ reduced in size; these spots largest in Bolivian examples, which have nearly always a distinct spot in the subcostal fork. The black distal area of the hindwing produced to cell at veins R² and R³, widest in Peruvian examples, in which the white spots R¹—R³ situated at cell are often very small; patch SC²—R¹ of ground-colour situated within black distal border small, often vestigial, always smaller than the black spot standing at its proximal side; pale postdiscal patch SC²—R¹ of *underside* of hindwing larger and less sharply defined in Amazonian, Peruvian and Bolivian specimens than in individuals from more northern localities. Width of cell of forewing and length of hindwing somewhat variable.

Hab. Colombia: probably "terra caliente" on eastern side of Cordillera of Bogota; from East Ecuador eastwards to Pará and southwards to South-East Bolivia and Matto Grosso.

Felder's specimens are said to be from "Bogota." As the "Bogota" collections, which nowadays come on the market, contain apparently only the preceding subspecies, it is possible that Felder's specimens are wrongly labelled, being perhaps obtained in Eastern Ecuador.

In the Tring Museum 65 ♂♂ from: "Bogota"; Coca, Rio Napo (W. Goodfellow); R. Cachyaco, affl. of R. Huallaga (Stuart); Chanchamayo (Schunke); Palcazu (Sedlmayr); Pozuzo (W. Hoffmanns); R. Chuchuras, affl. of R. Palcazu (W. Hoffmanns); Peréné R. (Watkins); Montanas, R. Madre de Dios (Ockenden); La Union, R. Huacamayó, 2000 ft. (Ockenden); Mapiri; Mushay, Beni R. August 1895 (Stuart); mouth of La Paz R. (Stuart); Yungas de la Paz (Garlepp); Prov. Sara, Santa Cruz de la Sierra, February—April 1904 (J. Steinbach); Villa Maria to Diamantino, Matto Grosso, January 1897 (Audeer).

c. P. dolicaon tromes subsp. nov.

- Papilio dolicaon*, Staudinger, *Exot. Tagf.* i. p. 18 (1884) (*partim*; Venezuela); Hahnel, *Iris* iii p. 203 (1890) (Valera).

♂. Similar to the preceding subspecies. Subapical greenish white cell-band of forewing, *above*, very slightly shaded with black; distal border of hindwing

broad, spots R^1 — R^3 of ground-colour situated around apex of cell small. Black distal border of forewing, *below*, narrow, about 1 mm. wide from R^1 backwards; the pale distal area continued beyond M^2 ; black discal band of hindwing crossing cell a little distally of point of origin of M^2 , there being a small spot of the ground-colour at the base of cellule M^1 — M^2 ; spot SC^2 — R^1 of ground-colour longer than, or as long as, the spot situated in apex of cell.

Hab. Northern Venezuela.

In the Tring Museum 2 ♂♂ from Palma Sola.

d. P. dolicaon dolicaon Cram. (1775).

- Papilio Eques Achirus dolicaon* Cramer, *l.c.*; Goeze, *Ent. Beytr.* iii. 1. p. 79. n. 34 (1779); Fabr., *Spec. Ins.* ii. p. 13. n. 51 (1781) (Amer. merid.); id., *Mant. Ins.* ii. p. 7. n. 57 (1787); Jabl. & Herbst, *Naturs. Schm.* iii. p. 142. n. 95. t. 42. fig. 3. 4. (1788); Fabr., *Ent. Syst.* iii. 1. p. 23. n. 66 (1793) (Amer. merid.); Gmelin, *Syst. Nat.* i. 5. p. 2237. n. 312 (1790) (Amer. merid.).
Papilio dolicaon, Godart, *Enc. Méth.* ix. p. 40. n. 46 (1819) (*partim*); Feld., *Verh. Zool. Bot. Ges. Wien* xiv. p. 300. n. 162 (1864) (*partim*; Surinam); Kirby, *Cat. Diurn. Lep.* p. 555. n. 237 (1871); Möschl., *Verh. Zool. Bot. Ges. Wien* xxxii. p. 304 (1883) (Surinam); Haase, *Untersuch. Mimicry* i. p. 84 (1893).

Cramer's figure represents this form.

♂♀. Greenish white subapical cell-band of forewing, *above*, not, or very little, shaded with black; distal marginal border of underside broader than in the other forms, 3 to 5 mm. wide at R^2 , narrower in female. Distal border of upperside of hindwing distant from cell; on underside the discal band crossing cell beyond point of origin of M^2 , spot of ground-colour at base of cellule SC^2 — R^1 as long as, or longer than, the spot situated in apex of cell; buffish postdiscal spot SC^2 — R^1 transverse; marginal tooth R^2 often prominent, sometimes with yellow dot on upperside at tip (corresponding to yellow apex of tail).

Hab. Orinoco; the Guianas.

In the Tring Museum 10 ♂♂, 1 ♀, from: Suapure, June 1901, and La Vuelta, May 1904, Caura R. (S. M. Klages); R. Demerara, July 1897; Surinam.

e. P. dolicaon deicoon Feld. (1864).

- Iphiclides dolicaon*, Hübner, *Verz. bek. Schm.* p. 82. n. 831 (1818?).
Eurytides dolicaon id., *Samml. Exot. Schm.* ii. t. 91 (1820?); Kirby, in Allen, *Nat. Libr., Lep.* i. 2. p. 272 (1896).
Papilio dolicaon, Boisduval, *Spec. Gén. Léop.* i. p. 347. n. 188 (1836) (Rio de Janeiro); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 16 (1845) (Brazil); id., Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16. n. 154 (1846) (Brazil); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 36. n. 176 (1852) (Brazil); Lucas, in Chenu, *Enc. Hist. Nat., Pap.* p. 38. t. 9. fig. 2. ♂ (1851-53) (Brazil); Gray, *List Lep. Ins. Brit. Mus.* i. *Pap.* p. 49. n. 184 (1856) (Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petr., Léop.* i. p. 4. n. 55 (1857) (Brazil); Butl., *Cat. Diurn. Lep. deser. Fabr.* p. 239. n. 19 (1869) (Brazil); Burm., *Descr. Rép. Argent. v. Léop., Atlas* p. 3. n. 2 (1873) (Corcovado); Oberth., *Et. d'Ent.* iv. p. 74. n. 227 (1880) (Brazil); Staud., *Exot. Tuff.* i. p. 18 (1884) (*partim*; Sta. Catharina); Bönnigh., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 27 (1895) (Corcovado).
Papilio deicoon Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 300. n. 164 (1864) (Bras. austral.); Staud., *l.c.* p. 18 (1884) (var. of *dolicaon*).
Papilio dolicaon var. *P. deicoon*, Kirby, *Cat. Diurn. Lep.* p. 555. sub n. 237 (1871) (Brazil).
Eurytides deicoon (?), id., in Hübner, *Samml. Exot. Schm.* ed. ii. p. 92. t. 304. fig. 3. 4 (190-?).

♂♀. White spots in black distal area of forewing large; subapical cell-patch seldom a little washed with black; black border to hindwing narrower than in

the preceding forms; white spot SC^2-R^1 within the black border sharply defined, the black spot separating it from the basi-discal area not always complete.—Discal band of hindwing, on *underside*, crossing cell at M^2 , the point of origin of this vein being within the band, the costal portion of the band a little more oblique than in the other forms, the greenish white basal area therefore more oblong; the yellowish white patches distally of the curved outer discal band sharply defined as a rule; veins in proximal half of wing more extended black than in the other subspecies.

Hab. Brazil: Rio Grande do Sul northwards; Paraguay.

In the Tring Museum 40 ♂♂, 1 ♀, from: Minas Geraes, February 1899 (Kennedy); Espiritu Santo; Petropolis and Rio de Janeiro; Bahru, Sao Paulo (Dr. Hempel); Castro, Parana (E. D. Jones); Sapucay, Paraguay, August and October 1901 and December 1903 (W. Foster); Jatahy, Goyaz.

169. *Papilio iphitas* Hübn. (1820?).

Papilio dolicaon, Godart (*non* Cramer, 1775, *err. det.*), *Enc. Méth.* ix. p. 40, n. 46 (1819); *Donov., Nat. Repos.* ii. t. 65 (1824); *Prillw., Stett. Ent. Zeit.* xxvi. p. 129 (1865) (Corcovado; "light yellow," perhaps *iphitas*?).

Eurytides iphitas Hübner, *Samml. Exot. Schm.* ii. t. 92 (1820?); Kirby, *ibid.* ed. ii. p. 92, t. 305, fig. 3. 4 (190-?).

Papilio iphitas, Boisduval, *Spec. Gén. Lép.* i. p. 348, n. 189 (1836) (Rio de Janeiro; var. of *dolicaon*?); Lucas, *Lép. Exot.* p. 14, t. 8, fig. 1 (1835); Doubl., *List Lep. Ins. Brit. Mus.* i. p. 16 (1845) (Brazil?); *id.*, Westw. & Hew., *Gen. Diurn. Lep.* i. p. 16, n. 155 (1846); Gray, *Cat. Lep. Ins. Brit. Mus.* i. *Pap.* p. 36, n. 177 (1852) (Brazil); Lucas, in Chenu, *Enc. Hist. Nat., Pap.* i. t. 11, fig. 2. ♂ (1851-53); Gray, *List Lep. Ins. Brit. Mus.* i, *Pap.* p. 49, n. 185 (1856) (Brazil); Ménétr., *Enum. Corp. Anim. Mus. Petrop., Lép. i. Suppl.* p. 68, n. 1122 (1857) (Brazil); Felder, *Verh. Zool. Bot. Ges. Wien* xiv. p. 300, n. 165 (1864) (Bras. austral.); Kirby, *Cat. Diurn. Lep.* p. 554, n. 237a (1871) (Brazil); Burm., *Descr. Rép. Argent. v. Lép.* p. 3, sub n. 2 (1879) (var. of *dolicaon*); Oberth., *Et. d'Ent.* iv. p. 74, n. 228 (1880) (Brazil); Staud., *Erot. Tagf.* i. p. 18 (1884) (var. of *dolicaon*?; Pernambuco); Haase, *Untersuch. Mimicry* i. p. 84 (1893); Bönnigh., *Verh. Ver. Nat. Unterh. Hamburg* ix. p. 27 (1895) (Organ Mts.; not near Rio).

♂. Similar to *P. dolicaon*; ground-colour creamy buff; distal border of forewing narrower behind, both above and below, than in *P. dolicaon*, veins M^1-SM^2 heavier black distally; yellow discal spot R^1-R^2 longer than the others.—Hindwing more rounded than in *dolicaon*; black discal band marked on *upperside* between SC^2 and R^1 , usually entering cell; extreme tip of tail yellow.

Black discal band of forewing below shifted to margin between M^1 and SM^2 . Nearly all the veins of hindwing black; discal band crossing cell distally of M^2 , spot of ground-colour in apex of cell smaller than the spot situated at base of cellule SC^2-R^1 ; one row of pale blue spots.

Neuration; SC^1 of forewing confluent with C; SC^2 free.

Genitalia: No ventral process on valve; proximal ventral angle of harpe not produced; central ridge without teeth at proximal edge, a long tooth near ventral angle corresponding to the transverse row of teeth of *P. dolicaon*, tip of ridge pointed, no teeth near it.

♀ and early stages not known.

Hab. Brazil.

In the Tring Museum 8 ♂♂ from: Fazenda Jerusalem, Espiritu Santo; Rio de Janeiro (E. May; doubtless from the Organ Mts.).

EXPLANATION OF NEURATION.

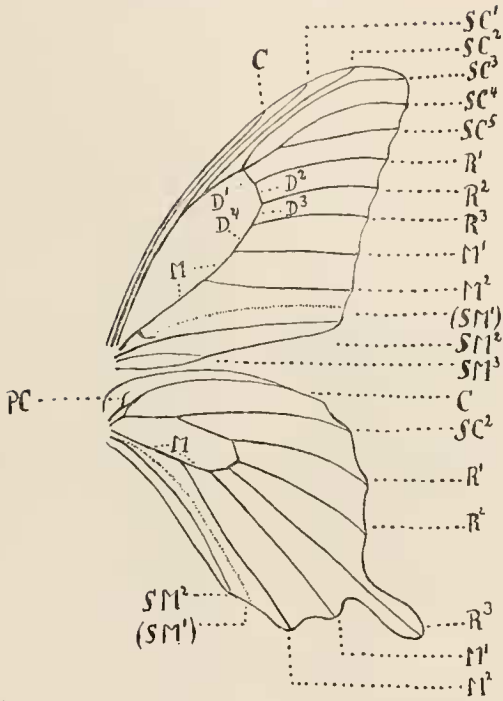


Fig. 4.